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J. E. WILLIAMS, EDITOR.

THE SOUTHERN PLANTER.

DEVOTED TO

AGRICULTURE, HORTICULTURE,

AND THE

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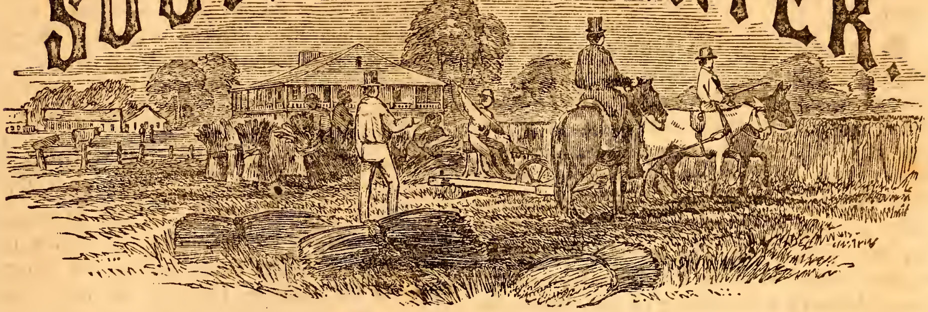

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J. E. WILLIAMS, Editor. AUGUST & WILLIAMS, Prop'rs.

Vol. XVIII. RICHMOND, VA., NOVEMBER, 1858. NO. 11.

[*From the Transactions of the Virginia State Agricultural Society.*]

The Economy of Farm-made Putrescent Manures—In reference to their Preparation. Preservation, and best Application.

BY EDMUND RUFFIN, ESQ.

[Continued from page 588.]

The application and action of putrescent manures—and especially of barn-yard or winter-made manure.

For nearly twenty years, the manure from my stable and cow-yard has been mostly, and, so far as circumstances permitted, applied on the surface of the land, and to clover. To most persons, this mode of application may seem the most wasteful and destructive of fertilizing principles. But, according to my limited experience and information, as well as to reason and sound theory, this mode is the cheapest, the most convenient, and also the most profitable use that can be made of the ordinary manures for field crops, wherever clover is suited to the soil and climate; and it is the more cheap and profitable, compared to the usual modes of application, in proportion as the manure applied is in a coarse and unrotted condition.

Before proceeding to the details of this process, and endeavouring to show its peculiar advantages, it will be necessary to make some general observations on the action of putrescent or alimentary manures, and the causes and manner of their waste; from which premises, if they be correct, may be deduced what would be the most or the least wasteful modes of application, even without the support of my experience and testimony.

Putrescent manures are composed of vegetable or animal matters, or mixtures of both. All such manures are subject to decomposition, or rotting; and, therefore, to the gradual change and final destruction of their substance, and waste of all the parts not put to use during the progress of decay. The parts thus subject to waste are capable of feeding and supporting plants; and hence, in their main value and proper use, putrescent manures are (or ought to be) almost entirely *alimentary* in their action. All vegetable manures contain some mineral and indestructible parts—earthy, saline or metalic. But these parts are so minute in quantity, that they scarcely need to be mentioned as exceptions to the general character of pu-

trescent manures as stated—that is, their being *wholly* fit for the food of plants, and as wholly subject to waste if not so used.

Fermentation is the process, or means, by which putrescent matters become active manures or fit for the nourishment of plants, and if they be not so used, when ready, fermentation proceeds to the utter destruction and waste of the manures. Fermentation may be either violent, as often is seen in heated stable manure, and rapidly producing the greatest possible waste—or as slow and gradual as in the natural decay and rotting of the leaves or grass fallen on the soils where they grew. But fermentation cannot begin, or, if already begun, cannot proceed, without the concurrence of three conditions. These are—1st, moisture; 2d, temperature above forty-eight degrees Fahrenheit;* and 3d, the access of atmospheric air. All these conditions are necessary, and if either one be wanting, there can be no fermentation or progress towards decomposition, and, of course, no waste or loss of fertilizing principles. These positions are among the established and received doctrines of chemical science, and therefore need no proofs here. From them it is an obvious deduction, that if manure, or any putrescent matter, be supplied with sufficient moisture and air, but the temperature be kept below forty-eight degrees, (or whatever is the minimum,) then there can be no fermentation, and consequently no waste of manure. Or if air could be entirely excluded, the most favourable conditions as to moisture and heat could not induce fermentation or decay. The total exclusion of air, however, (though it may be obtained for chemical experiment,) is impossible in agricultural practice. But every farmer must have observed how much the commencement or progress of fermentation in a body of manure, is retarded by the mass being closely compressed, and its state thus approaching to that of exclusion of air; and how rapidly fermentation is excited, or renewed, (the other necessary conditions being favourable,) by the mere loosening or re-heaping of the before compact mass, so as to permit the entrance and supply of air.

* This is the minimum stated by the late work of Bouissingault. Some earlier writers have placed it as low as the freezing point.

Again: If air and heat be furnished under the most favourable conditions, and yet moisture be entirely wanting, there can be no fermentation, and no waste of manure. And this latter state is nearly approached when manure has been spread thinly on the unshaded surface of plowed or otherwise naked and clean land, and remains thus exposed in warm and dry weather. And, therefore, in this state of entire exposure to sun and air, which is deemed by most persons to be the most wasteful for manure, there is, in truth, as little waste of solid parts as can possibly occur, so long as hot and dry weather continues. There may be some small loss of volatile parts only, under these circumstances.

There has been presented on many farms practical proof of the truth of this deduction, in summer cow-pens, left with the rich and highly putrescent manure exposed on the otherwise naked surface of the ground. This was formerly the general practice of Eastern Virginia; induced not by correct reasoning, but by the general carelessness and indolence of the cultivators. Our first distinguished agricultural author, John Taylor, maintained the propriety and high importance of plowing these temporary pens as quickly as the cattle are moved to a new one. He supposed "evaporation" to be the great agent of the waste and destruction of manure; and its being left exposed on the surface as the sure means of producing these results. But this was one of the points on which this enlightened agriculturist was entirely mistaken. Most of his many zealous disciples proceeded to obey his instructions, which seemed so reasonable. But the most judicious of those who adopted this new practice, as well as many other merely practical and ignorant farmers, observed that, on the cow-pens thus plowed in summer, the manure was much less effective and lasting than on similar pens not plowed until winter. This result seemed so strange, and so contrary to all sound reasoning, as well as to the highest authority, that many farmers could not believe the alleged facts; and even to this time, some continue to be incredulous, no matter how strong the testimony of such facts. But if tested by the chem-

ical laws above presented, it will be seen that they remove the opposing difficulties, and sustain the position even more strongly than has been done by experience and observation of actual results in farming practice. The summer cow-pens were not littered, and the trampling of the cattle in a few nights destroyed all vegetation, and made a hard, close, and bare surface. On this bare surface, the remaining manure consisting entirely of the excrements of the cattle, was left after a week or two, when the animals were moved to enrich another space. If this rich and very putrescent manure remains thus exposed, the hot sun soon dries it so perfectly, that fermentation either does not begin, or is soon checked; and this state must continue as long as the weather continues dry. When rain occurs, it penetrates the dried manure so slightly, that it again becomes dry very quickly, and before fermentation can make much progress, even if it begins. And, therefore, for want of enough and continued moisture, there must be but little waste of the manure.

But suppose this manure to be turned in by the plow, and covered by some four or six inches of soil: then moisture, the condition before wanted, is furnished to the manure from the earth, while the air still continues to have sufficient easy access, and the temperature, though lowered, is still as high as need be. All the three conditions necessary for fermentation are there operating in the most favourable manner, and its progress must be rapid accordingly. And, as there is no crop then growing on the land, nor any vegetation, to take up the products of fermentation, they must pass from one stage of decomposition to the next, subject to waste at every successive change, until the final result is reached, of the formation of gases, and their expansion and escape into the atmosphere, and being mostly carried far off by winds.

The strongest case of known practice has been here presented, to show how manures may be the most completely and quickly wasted by the very means used for their better preservation. But the principle is the same in all cases. And the foregoing statement may have more or less of application to many other and different kinds of manuring of land. If the positions assumed above are considered as established, then enough has been said already to show the fallacy of the generally prevailing opinion, that the *covering* of manure with the soil is the most effectual mode of *securing* it from waste. What will next follow, will serve as premises for the main proposition designed to be maintained, viz: that by top-dressing, on clover especially, there is less loss of manure, less labour required, and more sure and profitable returns, than in any mode of applying ordinary stable and cow-yard manures.

Let us proceed to consider the manner in which putrescent manure acts on soil and plants, and is acted upon by decomposing agents.

All putrescent manures, or vegetable or mixed materials of which manures may be made, and in every different state as to soundness or decay, consist of matter partly soluble in water, partly insoluble. The proportion of soluble parts in any one mass or kind of material, is the least before fermentation or decay has commenced, and also the less in proportion as the substances are solid, hard and unbroken. In this state of vegetable matter, the part which water can dissolve is very small. This soluble or extractive matter is the part, and that only, which serves as food for plants. Of course, manure, in this fresh and unbroken state, can then furnish but a very minute proportion of what is useful and nourishing to any crop; and nearly the whole mass is, for the time, inert and useless as manure, if not absolutely an incumbrance to the soil and crop, or an obstacle to the tillage. However, with every step of advancing fermentation or decay, more and more of the insoluble and inert parts become soluble and fit for use; and if permitted to feed plants as fast as the parts become soluble, then nothing of the manure will be wasted, and all will be put to immediate and profitable use. But fermentation or decomposition, which acts so beneficially, first in reducing the hard and before useless parts of manure to the soluble and useful state, proceeds next to act upon them injuriously. If the soluble parts of manure are not taken up by plants, their decomposition still advances—and every successive step serves to destroy or lessen some of the remaining fertilizing princi-

ples. The last result is the conversion of the remaining solid parts, soluble in water, to different gases, or aeriform fluids, highly expansive, and which must, as formed, burst forth from the confined space in the soil, to rise in the air. When such changes, of insoluble to soluble matter, and finally to aeriform, occur in a heap or body of manure, not in immediate contact with soil, and of course not to be drawn upon by the roots of growing plants, then the successive products are more or less exposed to waste; and when they reach the last or gaseous state, their escape and total loss is inevitable. If the changes and successive steps of decomposition took place in vegetable or mixed putrescent matters dispersed upon or intermixed with soil and within reach of the roots of enough growing plants, then nothing would be lost; because, as fast as the parts became soluble, they would be absorbed and put to use. And even if, under these circumstances, some gaseous products should be slowly evolved, it is most probable that they should be dissolved in the moisture of the soil, and thus pass into and help to support the plants.

The general changes and results of decomposing manure are the same, and as above described, without respect to the rate or manner of fermentation. If the manure be in mass, as left thickly covering a winter's cattle-yard, or is subsequently heaped, the fermentation will proceed with more or less energy, according to the degree of exposure to, and combined action of the three agents of fermentation, heat, air, and moisture. And the action will be the more quick in proportion to the richness of the mass in animal matter: or such as is the most putrescent, and which, therefore, serves as a leaven to excite fermentation in the whole mass. In such condition, and by too violent fermentation, the present or early acting value of the whole body, for any one time, may be greatly increased, by the great bulk of insoluble and inert materials being to considerable extent, made soluble. And all the previous gaseous products were driven off and lost by the same operation; and if thus remaining, the then soluble parts also in their turn, will become gaseous and lost in like manner.

If, on the contrary, the manure, when fresh, and before fermentation had made much progress, had been diffused through the soil, the same changes would have occurred, though more gently and slowly; and even the same losses—unless growing plants were present, and sufficiently numerous to take up the manure as fast as it became fit for their use.

My remarks have led me to anticipate incidentally, an opinion which ought to be more fully presented. This is, that the extractive and soluble parts of putrescent manures form the food of plants. This doctrine is that maintained by the great agricultural chemist, Davy; and clear and indisputable as he has made it appear, the doctrine was not only opposed to previous and received opinions, which are now left without an advocate, but is now opposed by the more recent and fashionable authority of Liebig. But it is not my purpose here to examine or discuss opposing opinions; and they are thus slightly referred to, merely to avoid producing the same impression, that Davy's opinion had been adopted and still adhered to, for want of comparing them with those, and especially the latter opinions, of others. Davy says:

"Vegetable and animal substances deposited in the soil, as is shown by universal experience, are consumed during the process of vegetation; and they can only nourish the plant by affording solid matters capable of being dissolved by water, or gaseous substances capable of being absorbed by the fluids in the leaves of the vegetables. But such parts of them as are rendered gaseous, and that pass into the atmosphere, must produce a comparatively small effect; for gases soon become diffused through the mass of the surrounding air. *The great object in the application of manure should be, to make it afford as much soluble matter as possible to the roots of the plant, and that in a slow and gradual manner, so that it may be entirely consumed in forming sap and organized parts.*"—(*Agr'l Chem.*, *Lecture VI.*)

The concluding sentence of this passage may be considered as the text of my discourse—the rule which I desire to be strictly followed in practice, and the test to which I submit the details of the particular mode of applying manure, here recommended.

The only portion, then, of putrescent manures which, for the time, can nourish plants through their roots, is so much as is soluble in water, and then actually dissolved; for no matter how much soluble matter may be in manure when applied, it cannot act as food for plants until rain, or some other source of moisture, produces solution.

The much larger part of the soluble matter of manures is such as is either solid or liquid. But even if the change be slow enough, such aeriform products may be absorbed by the moisture of the earth, and thus, in solution, be conveyed through the roots to nourish the plants. Water readily absorbs carbonic acid gas, by mere contact; and ammonia is so easily absorbed, that there may be condensed in water more than seven hundred times its bulk of this highly fertilizing gas. And even after gases, produced by fermentation, may have risen, by expansion, above the surface of the manured soil, partially saved by being absorbed and condensed in dew, and thus conveyed back to the roots.

But the most important mode by which plants receive carbon as food is in carbonic acid, from the atmosphere and by absorption through their leaves. This gas is diffused, throughout the atmosphere near the earth, universally and at all times, though in very small proportion, so that it is always present and abundant for the wants of growing plants. Thus it appears that there is no limit to the supply of this essentially necessary food, which, whether obtained through the roots from the earth, or through the leaves from the atmosphere, serves to supply the large quantity of carbon which helps to constitute every plant. But though there is no limit to the supply of this food, (carbonic acid gas,) from the atmosphere, and it is thus offered to all plants and in all situations, still there is a strict limit imposed upon the appetite of plants, or upon their ability to consume and be nourished by this food, and that limit is determined by the constitution of the soil, and the character of the other manures feeding the plant through the roots.

From all the foregoing preliminary propositions or premises, presented in this section, I shall now proceed to deduce the truths which it was the main design of this paper to establish; that is, to determine by which mode of application the fertilizing principles of manure may be best economized, by the largest possible portion being put to use as food for plants, and the least possible suffered to go to waste.

It has been stated above, that all putrescent manures, (in whatever stage of the progress of fermentation and decay, and also in the freshest and soundest state of the materials, before fermentation has begun,) consist partly of soluble matter already fit to serve as food for plants, and partly of hard, insoluble matter, inert and at that time useless as manure. The proportions and quantities of these different parts continually vary in the same body, with the progress of decomposition, by the insoluble parts changing to soluble, and the soluble to the gaseous form, and then passing off, and being lost. If manure, whether in its newest and soundest, or in its oldest and most reduced state, or in any intermediate stage of decomposition, be applied to land, and plowed under, as is usual, the soluble parts will be dissolved by the first abundant rain. If roots of then growing plants had already spread throughout the soil, and were everywhere present when this solution of the manure took place, they would begin immediately to suck up the liquid food thus offered, and in a few days the whole supply might be put to use, and converted to parts of the plants so fed. But if no plants were yet growing when this solution occurred, then none of this food could be put to such use. If the soil is properly constituted to combine with, and retain such putrescent matter, and also it then requires the supply, it may be so saved until plants are in possession of the surface, and demand and will consume the before useless food. But any excess of soluble matter thus furnished, and not consumed immediately by plants, and beyond the ability and need of the soil to combine with and fix—and also all subsequent supplies under like circumstances—would be subject to further decomposition, and finally to entire waste in the gaseous state. Some parts, while yet in the condition of solids dissolved in water, would pass off from the land with the excess of rain water, and flow into the brooks and rivers. Other parts would sink through the pervi-

ous sub-soil as low as the solvent rain water could descend in moisture. From this depth, perhaps, the dissolved matter may subsequently be drawn up again by the deeply penetrating roots of plants. But it is more likely to be carried still lower by other rains, and be lost in the sources of springs and wells. That the latter effect is often produced, and in a degree as great as the effect is disgusting, may be witnessed in every city built on level and pervious ground, by the offensive condition of the water of shallow wells.

Such losses must follow, to greater or less extent, the plowing under of manure on soil not occupied by growing plants; because there would be nothing to take up the soluble and gaseous products as successively and continually produced. If a few scattered plants soon after sprang up, (as in a field of corn just planted,) then some of the otherwise fugitive products would be arrested and put to use. But still the greater part would meet with none of the few scattered rootlets immediately, and, therefore, would be subject to waste, whether in a liquid or gaseous state, in the same manner as if no plants were there growing.

Now let us compare this, the usual mode of application of manure, and its necessary wasteful results, with what must be the effects of top-dressing on clover.

The preferable time for this mode of application is just before or about the time when the clover (then more than a year old since the sowing) first feels the warmth of spring weather, and begins to show the influence in its growth. Then, also, is the best time for a general cleaning out of the winter-made manure, because the necessity for feeding and littering cattle has then nearly ceased, and the older parts of the manure have become somewhat rotted, (as lying in the pens,) without any waste from excess of fermentation having yet occurred. Such manure, made principally of the straw and corn-stalks used plentifully for littering, and the remains of the dry and poor food of the cattle, when first dug up for removal in the spring, will be found to consist of a small proportion of rich and soluble extractive matter, (of animal more than vegetable origin,) and the much larger proportion of the undecayed, hard, insoluble, and of course, mostly inert vegetable matter, used for litter. If such coarse stuff is plowed under for corn, (as is usual when used in spring, and unrotted,) the difficulty of plowing under is considerable, and the coarser parts of the manure even continue to be obstacles to later tillage processes. These coarse parts keep the soil too open, and dispose it to become and to remain too dry. This dry state retards the decomposition and the occurrence of the useful condition of the manure, and prolongs the state of its being inconvenient to cultivation and hurtful to the crop. And, for these reasons, it happens in many cases, that the second plowing, given merely to cover the manure,—(and otherwise unnecessarily,)—or. otherwise, the postponing of the first and only plowing very late, so that it may serve both to prepare the ground for tillage and to cover the manure, costs more than is gained from all the beneficial effects of that part of the manure permitted to act.

If the same kind of manure be applied to clover, and spread immediately, the first abundant rain carries every portion of matter already soluble and nutritious to the roots; and these being spread throughout the soil, will immediately take up the whole of the soluble portion. Within a few hours after the manure is laid upon the land, even in its coarsest state, if rain comes so soon, all the portion then fit, is in actual use as food for the crop; and in a few days just so much of the manure is converted to clover. The increased growth of the clover causes it soon to cover the remaining coarse and insoluble manure, which still is as much in bulk as was the whole application. The shade and moisture thus caused, with the increasing heat of the weather, induce and maintain a slow and regular advance of decomposition of the remaining manure, before insoluble, but now daily becoming more and more soluble in part. Every successive rain carries these newly-made soluble parts to be absorbed by the roots; and thus to add more and more to the growth of the crop, and increasing the shade and moisture of the remaining course manure, and hastening the repetition and augmenting the force of the like operations. The manure is thus made to act as quickly as possible in feeding the growth; and the

effect on the growth reäcts on the manure, producing an increasing similar action and reäction. By August or September, (if not much earlier,) the coarse manure will be almost consumed. Instead of remaining either dormant or wasting in the barn-yard, it has before reäppeared in the new form of clover. And the augmentation thus produced in the two growths of clover, and both obtained within five months, is very far more both in bulk and value as manure, than the prepared manure consumed to produce this increase. For whatever amount of soluble manure may have been received as food through the roots, will have been doubled in its effect, and in the bulk and value of the increased growth, by aid of the additional supply of carbonic acid furnished from the atmosphere through the leaves to the plants. This gratuitous and bounteous supply of manure from the atmosphere, is used by the leaves strictly in proportion to the amount of food for plants, or of the total means of their support, derived from the soil through the roots. And thus, for whatever amount of manure that is given judiciously by the farmer to his crops, through clover as a manuring crop, he is rewarded by having an equal or perhaps greater value added by the bounty of Nature. And thus his drafts upon the unlimited manuring fund of the atmosphere will be accepted and paid, in exact proportion to the amount of manure or other aid to the productive power of his land, that his own industry and care have furnished. All plants are thus supplied with an important portion of their food and support from the atmosphere. This portion is *nearly* all the carbon received into their structure.* But all plants of the pea tribe, and among them red clover, draw more from the atmosphere, and less in proportion from the soil, for nourishment, than any other plants. Hence the great and peculiar value of red clover and of the field (or Indian) pea as manuring crops, wherever they have suitable soil and climate.

* According to Liebig's novel (and as I believe incorrect) views, the whole of the carbon in plants is received through the leaves, and none (subsequently to the first development of the leaves) through the roots or directly from the soil.

According to the cases above supposed, the farmer who applies his manure to corn, so far as it operates on that crop, converts so much of his manuring capital to grain, which he consumes or sells. If applied to clover, the operating part of the manure is as much as that both used and wasted on the corn land; and moreover, the product is consumed, but is reïnvested and doubled in amount as manure, within a few months; and all of which accumulation is ready to act upon and to feed the crop of wheat, which will be sown in the autumn of the same year.

And there is another case, of a practice formerly universal, and not yet entirely abandoned everywhere, with which the comparison of advantages presents still more marked results. This practice (copied from England, without regard to difference of climate) is the letting the winter-made manure remain in the barn-yard through the summer, either undisturbed, or still more violently and wastefully fermented. In such cases, besides all the actual products of fermentation, (the amount of which loss I do not pretend to estimate,) there is of the remaining part, which is saved, the loss of a year's use and profit. And the interest on this capital, if properly used, would have been one hundred per cent. in carbon furnished from the atmosphere. It may be objected, that the use of the barn-yard manure thus kept is not *lost*, (always excepting the wasted part,) but that the use is merely postponed for a year. This is true; but if the manure had been on clover, in the same time the amount and value would have been doubled. It would, in its new form, (of clover,) and in double quantity, be as fresh for recommenced action the next year, and as likely to continue acting for as many subsequent crops, as the reduced body of barn-yard manure, then first applied.

According to the views presented above, there can be scarcely any waste or loss of the solid, or even liquid and soluble parts of manure, thus applied to clover. There is, however, one source of loss, and which particular loss is greater than on the same score when manure is plowed under. This is the escape of ammonia, and perhaps other volatile parts of fermenting manure, which if of ammonia, is evident to the sense of smell when the mass of manure

is removed, and spread on the land; and of which the escape is greater in proportion to the richness of the mass in animal matter, and to the advanced state of hot fermentation. But this escape of gaseous products ceases with the first slight rain that falls after the manure has been spread; the volatile parts being taken up by the water and carried into the earth and to the roots. And even before rain may fall, and while the passage of the gaseous product continues, I do not believe the degree of loss thereby caused to be considerable, or to compare in amount with the other kinds of loss attendant upon other modes of manuring.

The main and by far the most important grounds for preferring the application of manure on clover, have been presented in the supposed operations of converting the greatest possible proportion of the manure to the food of plants, and putting it to that use in the earliest possible time, and the better avoiding the waste of fertilizing principles. But though of minor importance, there are other peculiar advantages of this practice, well deserving attention. These will be briefly stated.

The Flemish farmers, whose practices in manuring and improving lands have been so long and deservedly celebrated, act in obedience to a maxim universally received among them, that manure should never be applied immediately to grain crops; but to others of which it is desired to increase, not the *seeds*, but the whole vegetable product. They believe that the early effects of rich putrescent manure are most upon the stalk and leaf, and much less upon the grain. And, if they are correct in this opinion, then the benefit thus actually produced on grain crops may be more in appearance than reality; or that with a rank and heavy growth of stalk and blade, there may be comparatively but little increase of grain, following heavy and recent manuring. Every farmer has observed, on spots which had been very heavily dunged, that the general growth of wheat is as rank and luxuriant as possible, though the stalks are too weak to support the weight of the heads, and the grain is shrivelled and of mean quality. The Flemish maxim offers another reason for applying the manure to clover. For, in that, the object is not to increase the the quantity of seed, but to add to the growth of the root, stalk, and leaf.

There is a great saving of labour, perhaps amounting to one-half under ordinary circumstances, in applying the manure to clover, compared to other applications. If for corn, the breaking up of manure, for carrying it out, cannot well be done before April. If much earlier removed, the coarse litter will not have been weakened in texture, by the beginning of fermentation; and, moreover, the cattle ought not earlier to be deprived of any part of their bed of litter. Then let us suppose the removal of the manure to the field to take place just before the time of planting the corn on the same ground, which is the usual and the best time for this application. Then, either the land, having been broken up in winter, will require the extra labour of second plowing merely to cover in the manure; or otherwise, the plowing has been delayed, to be executed after the spreading of the manure. In the latter case, the plowing, by being so late, will usually be much more laborious and less effective; and as there is no time to wait, it is very likely to be done when the earth is not in good condition. Or, if plowed early, the cost of repeating the operation, will even be exceeded by other attendant disadvantages. In this case, the manure is hauled upon soft plowed land, with great labour to the teams, and some injury to the ground, even in dry weather, and both of which are much increased by the least wetness of the earth; and, with the usual amount of rain, the work must be suspended during half the scant and precious time intended to be devoted to manuring: and whether such suspensions of the work occur or not, the labour of carrying out, on plowed land, and plowing under all the manure of the farm, (or as much as ought to be made,) is a very heavy job, to be begun and completed within narrow and strict limits of time.

But, suppose all these difficulties to be overcome, and all the accumulated manure made in winter, and to the end of April, carried out and applied for corn; still, without resorting to the top-dressing plan, there will be no economical means of applying the stable-manure made during the next four or five months, or until

the time for the equally improper application of such manure by plowing under for wheat.

Now, comparing the two modes of application merely in reference to labour and to waste, all the difficulties are much less in top-dressing. Though there is a preferable time to push this application, indicated by both the clover and the manure, still it may be begun much earlier and continued much later, without any material or obvious loss. And the work may be done, (though not to the best advantage,) when the weather is too wet for any labour on plowed land. The manure made in stables or elsewhere on litter, during summer, or any other putrescent matters, needs not to be kept, fermenting and wasting, but may be carried out at any time, and spread on clover in any state. These summer applications, indeed, are not so beneficial as if earlier, because having less time to act. But it is much better thus to apply the manure, than to let it be wasted, as it would be on any plan of keeping it on hand.

There are other applications of manure on the surface longer and better known than that on clover, and which are advocated and practised by some farmers as the best modes. One of these is in winter upon wheat. When circumstances are favourable, and to limited extent, this is a judicious practice; but it cannot be extended far. It requires manures well advanced in decomposition, and ready to act quickly. The dressing should not be heavy. If it should not act early or strongly enough to produce perceptible benefit on the wheat, it will at least certainly serve to secure the standing of the young clover, which, on poor land, or in a dry season, would otherwise be apt to fail. The chief obstacle to this mode of top-dressing is the usual softness of the wheat land in winter, which forbids carting upon it, except when frozen hard.

A practice much more extensive formerly, was top-dressing, and with unrotted manure on corn, applied from the time of planting to as late as when the plants are several inches high. I have pursued this plan to a considerable extent, several crops. But, judging merely from one careful comparative trial of my own making, and one other reported by another farmer of my acquaintance, I infer that the effects of manure thus applied are less beneficial than when the manure is plowed under before planting the corn. Still there is much labour saved in the former compared to the latter application. And this saving perhaps may fully compensate for any inferiority of effect. But my own experience in top-dressing either wheat or corn, is so limited, that opinions founded thereupon are entitled to very little respect.

To be continued.

From the Country Gentleman.

Comparative Economy of Spring and Fall Manuring.

Professor Stoekler of the Royal Agricultural College, Cirencester, England, together with Professor S. W. Johnson of Yale, and several farmers in the State of New York and elsewhere, are it seems convinced that manures hauled out and spread broadcast on the soil during late fall and winter, do not suffer any material loss of ammonia, and other plant food, from such exposure; that the evaporation which invariably affects manure in such conditions, does not carry off any considerable quantity of the elements used as food by plants, and which therefore it is desirable to prevent the waste of, whether such waste results from evaporation or otherwise. As this view, demonstrated I believe, at Cirencester College, is novel, and the reverse in some respects of that which has long governed the practice of manuring, and the hypothesis on which it hinges, viz: that it is most economical to plow in manure as soon as it be spread—which includes spring manuring where plowing is delayed into spring—because of the supposed loss by evaporation, &c., after spreading—it deserves somewhat closer attention, in order, if possible, to discover the reason of the change. More especially should we inquire into it, because the improvement of modern agriculture results more from the application of real manure, substantial plant food, than from almost any other condition.

A certain, say sufficient, proportion of water is necessary as a condition to the partial solution preliminary to the fermentation of any substance it is wished to ex-

pose to the process of rotting; and if such proportion, which varies according to the composition of the substance, be lacking in any degree, rotting will be incomplete in proportion to the deficit, and fire-fanging—the result of too dry fermentation—will result. But when the moisture present is in proportion to the quantity of heat evolved by the commingling of different substances, and the subsequent liberation of their gases from organic combinations, as in straw, humus, animal excrement, &c., &c—no result as fire-fanging, or too dry fermentation can take place. A like incompleteness in the process of fermentation and rotting will be the result, if a similar lack of another of the conditions thereto—as heat—prevails. In this case, however, when water is much in excess of heat, the nutritious properties of the manure heap will not be burned, but soaked out or absorbed by the excess of water; and in whatever manner such excess of water passes off—whether it flows or evaporates—it will carry away a large portion of the best properties of the manure held by it in solution, with it; leaving the manure by so much deficient, as in the case of driving off valuable matters by excess of heat in fire-fanging. It is equally obvious that the presence of air, in either deficiency or excess, would affect the process in the degree of its variation from the true proportion. (Hence, in England, turning thick yard-dung and compost heaps, to secure the necessary amount of air, is generally practiced, and therefore practically appreciated.) If too much or too little air be present, the conditions will be out of proportion, and the materials under process will become too dry or too moist, according as evaporation has been too great or too small in extent, excess of air drying the mass, and too little allowing the contained water, together with the equalization of heat by the atmosphere, to cool it below the point required for fermentation. Hence the practice of covering unrotted manure heaps with mold, to keep the necessary heat and moisture. These seem to be facts well verified by long exposure to observation—and the resulting conclusions are therefore supposed to be correct; and if so, it is certain that whenever air or moisture be present in too great or too small proportion, the conditions necessary to produce well rotted manure are incomplete to an equal extent. As to heat, this condition is in a large degree produced in the fermenting mass, or perhaps, rather changed from a latent to to an active state by the frictional movement of the parties as they are separated by disorganization, and move to the new positions and relations to which those affinities assign them, the degree of their volability and affinity being the measure of their motion, and often combination.

It was demonstrated, I believe, by the same professor at the Cirencester College, that ammonia, the substance which is of so much value to plant and animal, is not set free or lost from manure except as the result of fermentation in some degree.

If, then, manure be spread at the time of drawing out, or immediately thereafter, and plowed under, no time comparatively elapses for the loss of its ammonia. But the method is very inconvenient, so much so that sometimes it prevents the drawing out of it in the spring at all. To get the manure under in a fresh state, requires two teams at least, and attendants, a doubling of the ordinary forces—a majority of farmers having but one—and needing no more in the usual course of farm work. If the manure be drawn and dumped or heaped, there still remains the spreading to be done, the hauling, heaping and spreading, together require much more time than would be consumed in spreading directly from the wagon—if carts be not used—at the time of drawing. Besides, an objection to heaping is, that there is always more manure left where the heaps stood, than on other parts of the ground—the consequence of breaking up by repeated moving.

But even if some waste should take place from the broadcasting of manure on the soil in the fall or winter, and allowing it to be uncovered for several weeks, or months even, before plowing under, such loss must be very trifling, because fermentation is prevented by the cold air of this season, and no loss of nutriment takes place by the mere evaporation of water without fermentation; hence manure does not lose its ammonia by being exposed during the winter, even if it blow and rain, and snow and freeze. But to draw out manure at the time the ground is fit to plow—the ground is not dry enough to

bear up the wheels till it will do to plow—will cost at least twenty-five per cent. more than drawing it in fall or winter, from the difference in the value of time and labor, leaving the indirect loss of thus consuming time needed for the peculiar labors of the season, out of the estimate. Such objections, and others, in drawing out manure in spring, which might be drawn and spread in the fall, present themselves. Spreading fall or winter drawn manure should be always preferred to heaping, because when manure is heaped, the middle of the heap is exposed to fermentation, and this in extent according to the size of the heap—the heat necessary to such effect being set in motion by chemical action, protected from the cold by the outer part of the pile; the resulting loss by fermentation need not be now reiterated. Thus then, although more bulk of and moisture manure appears to be left by heaping, it is really quite otherwise as to real manure, for its essence has been dissipated by the liberation consequent on the heat in the middle parts of the heap. These, and the repeated occupation of time and labor, comprise some of the objections to heaping manure at any time. But no treating in the heap and consequent loss, no further occupation of time in spreading, &c., follows, when manure is drawn out in the fall and spread as fast as it is drawn. So treated at those seasons, but little evaporation and no fermentation can take place, and there is therefore no loss of value, or comparatively none, attending fall and winter manuring.

These views are based in part on Prof. Voekler's demonstrations, but more so on facts exposed to general observation; and if correct, the general theory that manure loses its nutrient properties by being drawn out and spread in the fall and winter—and should not therefore be thus treated till spring—is based on a fallacy, and the practice resulting from it may not only be relinquished without loss or regret, but with reason and advantage, and in many instances doubtless, such will be the result, equally to the individual and public benefit. J. W. CLARK.

To kill cockroaches—get a pair of big boots, then catch your cockroaches, put them in a barrel and dance on them.

From the Valley Farmer.

Cooking Food for Hogs and other Farm Animals.

The most stubborn obstacles to agricultural progress and improvement, are the the result of long established prejudices and practices that have often grown out of necessities that now no longer exist. To remove these prejudices and establish a reform, nothing short of repeated practical demonstrations will suffice. If facts and arguments were wanting, one would suppose that what we have already given in the Valley Farmer, would convince every husbandman of the importance of the artificial preparation of food for domestic animals, particularly at the present advanced prices of farm produce. If we take a *physiological* view of the subject, and compare the wants of man with certain domestic animals, whose organization differs in no essential particular from his own, we think the importance and economy, (not to say humanity,) of the subject is clearly established. Man, even in his uncivilized state, prepares his food mostly by some method of cooking, and to compel him now to eat it raw would neither prove conducive to health, nor qualify him for the duties and labours he is required to perform. Whether the same necessity exists, or the same advantages are gained, in cooking food for ruminating animals, we are not so fully prepared to establish by well conducted comparative experiments, yet, so well satisfied on this point are some of the best dairymen in the country, that they seldom feed their milch cows on any but cooked food, including hay, straw, oil-cake meal, and other grains.

Mr. B. Rives, an intelligent farmer of Ray county, Mo., gives his views in the November number of the Farmer, (page 342,) and concludes that when corn is worth fifty or seventy-five cents per bushel, and the labour of a hand is worth one dollar and a quarter per day, it "will not pay," and concludes by remarking that the most economical method under the circumstances, is to fence off a field of corn and let the hogs help themselves.

We have no doubt, that if hogs are turned into the field, or fed on corn and stalks cut up while the grain is in the milk, that the same advantages are secur-

ed that result from the cooking process. But the period is so short when the corn is in this condition, that but a temporary advantage is gained by feeding in that way, and some more permanent arrangement must be adopted to secure the same results.

In the last volume of the Valley Farmer, (page 376,) we gave a detailed account of the experiments of Samuel H. Clay, of Kentucky, in feeding several lots of hogs, alternately changed from raw to cooked, and from cooked to raw food, ground and unground. With considerable trouble to ourselves, we prepared the statement in tabular form, so as to present at a glance the various facts afforded by a well conducted and most thorough experiment.

Mr. Clay's experiments show, that to make pork on dry corn, one bushel gave, in one instance, a gain of five pounds and ten ounces. In changing the food, on the same animals, to boiled corn, one bushel produced a gain of *fourteen* pounds and seven ounces, and a bushel of corn ground and cooked, gave a gain of *sixteen* pounds and seven ounces; while in another instance, after a change from dry corn to cooked meal, the gain upon one bushel was but a fraction short of *eighteen* pounds.

These experiments then show an average gain of about *three* pounds, when the animals were fed on cooked food, to a gain of one pound when fed on dry corn. Or, to reduce the comparative cost of the gain per pound, estimating the corn at 28 cents per bnshel, the following are the results: When the hogs were fed on dry corn, the average gain cost a fraction over 4½ cents per pound. The same animals, when fed on cooked meal, the gain cost a fraction over 1½ cents a pound, or when fed on cooked corn, unground, the gain cost 1 cent and 9 mills per pound, leaving but four mills, or less than half a cent, per pound in favour of that which was cooked unground, or allowing but four mills per pound for grinding, exclusive of the greater time required to cook whole corn, over that which is ground. But to come to the point more definitely, we will reduce the price of the corn to 25 cents per bushel, (which is as low as may now ever be expected, except, perhaps, in some remote quarter,) and reduce the gain from two-thirds to one-half, for the difference between cooked and uncooked food, which will be equal to *twelve and a half cents on each bushel of corn fed out*, and see how the question will stand.

With a properly constructed apparatus and suitable feeding arrangements, one man can cook and feed out 100 bushels of meal in a day. To do this, his meal must be placed in bins so as to be conducted into the steam vat without handling, and his feed troughs so arranged that the slop will flow into them in the same manner, without handling. But if corn is cooked without shelling or grinding, two men would be required to manage the same quantity. In the first instance, then, there would be a saving of 50 bushels of corn, which, at 25 cents per bushel, is $12 50, to be offset by the labour of one man, one day, which, at $1 25 per day, leaves a profit of $11 25 in favour of cooking. But, if the corn be cooked whole, and requires to be fed out by hand, allowing two hands, at the same cost per day, there will still be a gain of $10.

But to simplify the question still further. Is it not cheaper to cook 100 bushels of corn than it is to raise 50 bushels? But besides a saving of one-half of the corn, by the process of cooking, there are numerous other advantages to be taken into the account. The same weight is attained, according to the experiment above quoted, in *one-third* of the time, or we will reduce this also to *one-half*, avoiding the risk of accidents to animals on the time gained, the care and attendance in feeding, the advantages of weather in the earlier and more favourable season for feeding, together with other incidental matters not enumerated.

The conclusions, which are generally arrived at, are predicated upon the idea that prevails in regard to the cost of cooking food, according to the primitive methods employed in the East in a single kettle, or Mott's agricultural boiler. These are adapted only to small operations, and, of course, to depend on them, would incur considerable cost for labour, fuel, &c. But we should not forget that this is a progressive age, and the inventive powers of our countrymen are adequate to any emergency of the times, or demands of the age. Every one who is acquainted with distilling, knows that many hundreds

of bushels of corn go through the destructive process, in one of these establishments in a single day; and if the same quantity was only to be prepared as food for swine, with boilers constructed alone for that purpose, the same work could be performed with greater facility, and less labour. To provide a boiler and steam vat of a capacity suited to extensive feeding, with the necessary fixtures, would cost several hundred, or perhaps a thousand dollars, but like many other branches of business, we are convinced that the larger the establishment, the more profitably it may be conducted, and that, not only may the cost of the fixtures soon be saved, but a large per centage of the corn usually fed. We have before given a very excellent plan for the construction of suitable steaming works, adapted to extensive feeding. Since then a new and valuable steam boiler and furnace before referred to by us and suited to moderate operations, has been invented and is now manufactured and sold by Hedges & Free, of Cincinnati, Ohio, and which is illustrated in the present Volume of the Valley Farmer, page 21.

We are perfectly satisfied from our own repeated experiments, which have been fully sustained by those conducted by others, that with a suitable establishment of capacity adapted to the end in view, a great saving may be secured by this method of preparing food for swine, and we believe with scarcely less profit for beef cattle. We wish some philanthropic, enterprising farmer, would take the matter in hand, and make an experiment on a dozen or more bullocks, through a full course of fattening, on steamed food, both grain and hay, with an equal number fed in the ordinary way.

If grain is not to be cooked, we still contend, as we ever have, that it should be well ground, whether fed to hogs, cattle, or horses, and to cattle and horses it should always be given in combination with the coarser food.

Waterproofs.—For hats, boil 8 lbs. of shellac, 3 lbs of frankincense, and 1 lb. of borax, in sufficient water. To waterproof cloth for sportsmen, dip it in a solution of acetate of lead, with a gum and solution of alum (both solutions of the same strength.) For modus operandi, see *Phar. Jour.*

From the Working Farmer.

Water—Its Importance in Vegetation.

This general vehicle in nature, by the help of which all the gases resulting from decomposition are collected and carried to the roots of plants; the excretory gases of all animals find their way through the delicate pores of the skin; and by its presence as a lubricator, all matter is rendered in degree mobile, as may be required, without a corresponding amount of chafing or friction. It becomes the cleanser of the atmosphere as in the falling of dew, and the solvent of the more staple inorganic constituents of the soil, carrying these into plant-life and exuding itself in a pure condition from the surface of leaves, ready to re-perform its voyage of usefulness. It holds many inorganic substances and compounds without increase of its own bulk; during summer, when the scorching rays of the sun might otherwise destroy plants, the curious property of water during evaporation of taking up and rendering latent large amounts of heat, prevents the disorganization of leaves and tissues by thus reducing their temperature. The all-pervading moisture of the atmosphere is carried into soils, and there deposited on the surfaces of particles colder than itself, presenting infinitesimal fibres through which nature's gases may percolate, and by the presence of which their effects on inorganic matter are many times multiplied; for to its presence is due that change of condition in inorganic nature which defies the scrutiny of the chemist and the philosopher, and without which organic life could not progress.

The leader of *Hovey's Journal of Horticulture* for June, is as follows:—[Ed.

"Water," says Loudon, "whether as a source of nutriment, or a medium of effecting various other objects, is one of the most important agents in cultivation." It is, perhaps, quite unnecessary that we should make this quotation from so eminent a writer as Mr. Loudon, who undoubtedly has said only what others have said before him, as the basis of our remarks, or that we should suppose any cultivator, who knows anything about vegetation, would have any other idea in regard to the importance of water in the growth and culture of trees and plants, than that contained in the above extract. Without water, all vegetation would cease at once. The simplest individual understands this. No plant could perform its necessary functions for any length of time, unless we except the cactæ and some other peculiar tribes: and hence its use and value are, to a certain degree, appreciated and acknowledged by all. But it is only in degree—for very few even among intelligent cultivators really know how great an agent it really is, and a still less number who understand the principle of its application, or the requisite knowledge to attain the best results from its use.

A chapter on this subject we have thought not inapplicable at this time. Our ideas of gardening have, in the main, been derived from the works of English cultivators,—our own horticultural literature being, of a necessity, yet scanty, and, in the main, borrowed from the former. So far as general principles are concerned, there is no difference in this respect, whether we study the one or the other; but in regard to details there is a vast difference, and they are as widely unlike in many things as can well be imagined. But though we follow so nearly in most instances the practice of English writers, in one we fall short—far short of them. And this one is in the use of water. Though with an average temperature several degrees higher, a bright sunshine far stronger, and a fresh breeze direct from the tropics, we think far less of the importance of water than they do, and scarcely use it, except when necessity requires, only for the growth and perfection of plants in pots.

It is not necessary that we should enter into a statement of the difference between the climate of Great Britain and the United States, as we have done so before, in our previous volumes, and have shown how much more mild and cool the climate of the former is in summer. The average quantity of rain is nearly the same as our own, varying from thirty-five to forty-five inches; but it is distributed much more evenly, falls in smaller quantities and much oftener, and is more effective from the better condition the plants are in to receive it, their leaves not being so much affected as by the higher temperature and atmospheric dryness of our warm summers. True, occasional seasons of drought occur in Great Britain, as in our country, but they are only comparatively dry, and vegetation does not suffer as during one of our July or August droughts, when it would seem as if every particle of moisture was exhausted from the soil. While with us agricultural crops are often severely injured by excessive droughts, in Great Britain they are only damaged by excessive dampness. This difference of atmospheric moisture, though understood by many who are conversant with the climate of that country, is not sufficiently known to render our remarks understood without this brief comparison.

As we have above stated, while we follow so implicitly many of the directions of English cultivators, we fail in one of them, viz: the application of water. Why this is so, we are not able to say. We rarely water garden crops of any kind; occasionally we look after some favourite plant, and see that it is duly supplied with this element till well established, when it is left to itself,—but no systematic attempt is made here, as in Britain, to water whole crops of either fruit or vegetables. Recently having occasion to look over some of the horticultural works of the most experienced English writers, we were struck with the frequent repetition of the advice to apply water to almost every fruit tree, plant or vegetable; and, as a sample of such advice, we quote the following:—

Marshall, an old and experienced author, remarks, "that strawberries and cauliflowers should generally be watered in a dry season; strawberries, more particularly when in bloom, in order to set the fruit—and the cauliflowers when they show fruit, in order to swell the head: in a light soil this ought never to be omitted. In very dry weather, seedlings, asparagus, early turnips, carrots, radishes, and small salads, will need an evening watering." He adds, "Water to the bottom and extent of the roots as much as may be. The wetting only the surface of the ground is of little use, and of some harm, as it binds the earth, and so prevents showers, dews, air, and sun from entering the soil, and benefiting the roots as they otherwise would do. The ground about plants which are frequently watered should be occasionally stirred and raked. Many things are impatient of being kept wet about the stalks, and therefore watering such plants should be generally at a little distance." He recommends "watering the roots of wall trees in dry weather effectually; watering wall trees with an engine in the evening refreshes them much, and helps to rid the trees and wall of insects and filth."

Our cultivator complains of the mildew upon the gooseberry. Read how English gardners treat their bushes: "By preparing," says Loudon, "a very rich soil, and by watering and the use of liquid manure, spading and thinning, the large fruit of the prize collection is produced. Not content with watering at the root, and over the top, the Landcashire connoiseur, when he is growing for exhibition, places a small saucer of water immediately under each gooseberry, only three or four of which he leaves on a tree. This he technically calls suckling."

"Water," says Loudon, "is essential to a good crop of strawberries in dry weather, and may be performed on a large scale by means of a barrel fitted in a proper manner, or, on ordinary occasions, by a common watering pot. Some amateurs grow their plants in beds having small open-built channels as alleys, and then, the beds being formed on a perfect level, by filling the alleys with water, it penetrates the soil of the beds on each side."

Hollyhocks—"If dry weather sets in," says Turner, "keep them well watered after mulching." "Continue," he again says, "to water dahlias over the foliage every evening during dry weather, and practice a good root watering once a week, according to the weather." "Phloxes," says one of the best cultivators of this fine flower, "should receive a good watering once a week."

We might multiply these quotations to any extent, but they will be sufficient to show to those not familiar with English gardening, the

extent to which watering is used on some particular crops, and more or less on all, when superior culture is an object. If all this is required in the climate of that country, how much more need that it should be resorted to in our own, where evaporation is carried on with double the rapidity that it is in that cool, drizzly and humid isle?

Having suffered much the last two dry years from a scarcity of water for our plants, we have seen the ill effects of short supplies of this important element in vegetation; and now, with the means of its more liberal use, we have already seen how much plants are improved. A sprinkling of water is oftentimes attended with real injury, for the top soil is kept damp, which deceives all but the skillful cultivator; and hence the bottom are constantly dry, while the surface roots are constantly soaked. The effect of this kind of watering, which is quite too general, is, that the roots at the bottom are dried up, and those at the top rotted off. When water is given, it should be in sufficient quantity to thoroughly moisten every particle of soil.

Our finest fruits are oftentimes a failure, from the want of a liberal supply of water; the cracking and splitting of our large and fine varieties arises, as we have before frequently stated, from the absence of a proper degree of moisture. If the soil is not naturally deep, so that the roots can penetrate and find the moisture which they need, this deficiency must be supplied, or the fruits will not attain their full size. It is useless to expect any other result. Not only should it be supplied at the root, but, if possible, over the foliage and fruit. The crop of strawberries would be, undoubtedly, in many instances, doubled by half a dozen liberal waterings. The roots lie near the surface of the ground, and when this is exhausted by long continued dry weather, how shall the plants receive their nourishment if not by artificial aid? We wonder at the size of the large strawberries which are occasionally seen at the London exhibitions, but if we knew the pains which were taken to produce them, they would cease to be wonders. The wonder rather is, how we raise such large strawberries in our own climate, where often, during the entire ripening of a crop, not sufficient rain falls to moisten the soil to the depth of an inch.

Vegetables of many sorts, particularly lettuces, cauliflowers, broccoli, &c., can only be grown to perfection with the aid of liberal waterings. To have them large, tender, and succulent, they must not be cut off from a constant, steady supply of water; and, when the rains do not supply this, it must be done by artificial aid. It only needs a trial of those raised with proper attention to moisture, with such as are produced without it, to decide which are the best.

Every garden should, therefore, have the means of commanding a ready supply of water. It cannot be considered complete without it. There should be cisterns, or wells, or reservoirs of ample capacity to afford an abundant supply through the longest drought. Not that we would confine watering to seasons of drought alone, but that then, when it is more needed, there should be no want. Watering, we are convinced, is not half enough attended to in what is generally termed moderately moist weather,—for, though occasional showers may invigorate the plants, cleanse the foliage, and keep the surface-soil moist, there is a deficiency beneath, which a good watering will replace, and the colour and growth of the plants will surely attest its presence.

Of the details in regard to watering, we have not time and space to enter into at this time, but shall reserve them for a future article, trusting that what we have written will have shown the importance of water in all successful horticultural operations.

From the Louisville Journal.

Premium Essay on the Plow and Plowing.

We give below the *essay on the form, draft, and structure of the plow, and plowing,* to which was awarded the premium of the *Southwestern Agricultural and Mechanical Association.*—[Editor.

The *plow* is the most important of all the implements used by the farmer. It is proper it should receive proportionate attention from all who are endeavoring to increase the productiveness of the soil. Nothing, therefore, should be overlooked which promises to throw light upon its improved construction or management. Although much attention has been bestowed upon the plow by scientific men, it has not been much modified by the application of any new principle since it was first made in its present form. It is true that from time to time modifications have been made to meet certain requisitions, and in some minor matters it has been improved, yet a plow of twenty years ago and the plow of to-day differ but little in form or structure, except in better selected material and improvement in mechanical skill.

While we should place the highest estimate upon an implement of such importance as the plow, which has remained nearly stationary as regards improvement, it certainly will not do to rest satisfied or to look upon it as perfect, when, in every other branch of industry, the best implements of yesterday is superseded by one still more perfect to-day; more especially when the importance of stirring the soil to a greater depth than is practicable with our best plows is fully admitted by all farmers.

It will be useless in an essay of this kind to review the history of the plow from its first rude structure to its present state; it is thought

better to take it at its present perfection, and, if possible, suggest improvements which may be made. As mechanical arts make advancement it is found that a necessity arises for new varieties of tools, and artisans, who used but few in the infancy of their professions, find it necessary to adopt various modifications of these tools to meet the requirements of their improved art. It is so to a great extent with the implements of agriculture; instead, therefore, of endeavoring to find a plow that shall answer for *sod, stubble, sub-soil, and tillage*, it will be better to find out what peculiarity is requisite to make it perfect for any one of these purposes, and form the plow for that purpose alone, instead of endeavoring to make it capable of being used for all.

In suggesting improvements in the construction of the plow, as in all other things connected with farming, it will not do to consult science without taking experience into the council. The calculations of the mathematician are sometimes thwarted by some unknown or unforeseen principle, only detected when attempted to be applied to practice.

Every observing farmer, while following the plow, has thought of some improvement which he could make if he were a mechanic, by which its working might be improved; in many cases if these thoughts could be worked out by an ingenious mechanic, the thing required would be accomplished and improvements result. As it is, the farmer having to make his idea clear to the mechanic, who labors generally under the disadvantage of not understanding the object of the proposed modification, it requires generally much patience even to approach the desired improvement. There is one circumstance which tends to render improvements in agricultural implements slower than in the implements of the mechanic. The farmer uses his implements generally by seasons, and any suggestion, which he may wish to have acted upon by the mechanic, or any experiment by the mechanic, submitted to the farmer for trial, must be tested in the season of that implement, be it plow or reaper, or it must lie over for another season, with great liability of being altogether forgotten.

A plow for the purpose of breaking up new ground should be so constructed as to cut all but the largest roots, and not be liable to hang upon those too large for it to cut. To meet this requisition a cutter should be constructed to pass through the beam perpendicular to the surface of the ground, and rest upon the point of the share by a shoulder on its edge nearest the plow, the cutting edge to be rounded from a line with the bottom of the share to such a point on its front edge as shall be found to bring sufficient force upon the roots which it meets to sever all which are not too large to cause the plow to pass over them by their resistance against the edge of the cutter. The land side should be closed with a plate of steel, to prevent the ends of the severed roots fron hanging in the plow as they spring back. I every other respect it may be formed like a common sod plow. An implement somewha on the above principle has been constructe and found to work well on new ground. A light draft and complete inversion of soil are th desiderata in the new-ground plow.

The sod plow is probably the most importan modification of this implement. In breakin up sod land the aim is so to invert the sod a entirely to kill the grass and at the same tim bury it so deep that the culture of the cro shall not bring up the grass or disturb the in verted sod. For this purpose the principle o the double plow seems well adapted, as th foremost plow cuts off the sod and deposits i in the bottom of the last furrow. The objec tion to the double plow now in use seems to b its heavy draft, but, by the use of two or eve three yoke of oxen, the most perfect plowin can be done with it. If horses are used, a team of three horses, harnessed with a com pensating double-tree, or, as sometimes called a triple-tree, will be found a more efficien team than four horses attached to the plow b means of wagon wheels, as is generally prac ticed. The modification necessary to adap the double plow to sod land seems to be tha the small-furrowed plow should have a mould board with a low angle, so as merely to tur the sod over in an inverted condition into th furrow below it. It should not be required t *lift* the sod or soil at all. It should be provi ded with a sharp cutter. The after plow which is larger, should have its mouldboar long and of easy slant enough to lift the soi well out of the furrow and deposit it high upo the last furrow-slice. These first objects bein attained, if draft will admit of it, it may b steep enough to crush and disintegrate the soi as much as possible, as this is one object in plowing to prepare the soil for crops. As a team of two horses will always be the most desirable plow team for the majority of farmers on account of its adaptedness to all other work on the farm or road, it is very desirable tha plows should be constructed with a view to the adaptedness of their force, even for the deepest tillage. It will be more economical, therefore, where thorough work is done, to use *two* separate plows and teams to do the work which the double plow purposes to do with one. In this case the different modifications of the plow should be adhered to, but, as the draft is to be divided equally, the foremost plow should be made to run deeper than is contemplated in the double plow. The equal division of the labor can only be decided by the use of the *dynamometer*.

This method of plowing has long been practiced and is called trench plowing. It would seem that the great defect in practice, heretofore, has been in using two plows of similar form and construction for such very dissimilar

work. As in the case of the double plow, the foremost plow used in trench plowing is not required to lift the soil, but to invert and deposit it in the furrow below the level of its share. Having but little lifting to do, it is probable, that, when the dynamometer is applied, it will show that this plow should take the largest portion of the depth of furrow. As the plow which follows this will have to elevate the soil, it must have greater length of mouldboard and a more gradual curve. Experience alone can determine how the labor should be divided between the two teams, and also the width of furrow-slice, to admit of its being done by two-horse teams to the greatest advantage to the greatest depth. This plow may answer for other purposes, but no view to its usefulness for other work should be allowed to prevent its form being as perfect as possible for the one object for which it is made.

The next modification of the plow is for stubble land. For this purpose it must be high in the beam and so constructed as to clear itself of the dry grass and stubble, and, while it runs deep, it should fully invert the soil and leave it in a mellow condition. The stubble, grass, and weeds must be entirely buried in this case as well as in sod land; but, as the soil is generally in a light and friable condition, a shorter mouldboard, in a more upright condition, is admissible so far as to admit of as deep tillage as the team can manage, for the purpose of disintegrating the soil. In this plow the cutter may be dispensed with, and the throat of the plow should be so constructed as to prevent its choking by the accumulation of the stubble; the beam should be high and curved.

The next modification of the plow is for fallow land, and for an operation not generally performed, but which is a very important one in preparing land thoroughly for spring crops; that is, cross plowing the land in the spring which was broke up in the fall. This plow should have a very narrow, high, and comparatively steep mouldboard. It should be narrow to allow the power of the horses to run it deep into the ground, which of course must be done at the expense of width of slice. It should be steep to crush and mix the different portions of the soil that it runs through. By this method the decomposed grass and roots, or manure, inverted by the sod or stubble plow the previous season, will be mixed through the entire soil, instead of being thrown nearly all to the surface, as would be the case with a plow of the common construction. The effect of manure, or the decomposed vegetable matter, is felt but to a limited extent by the growing crop, unless it is thoroughly mixed with every portion of the soil; and the more thorough this mixture, the better, all things else being equal, will be the succeeding crop. In addition to this thorough mixing of the manure and other organic matter, this plow is designed to grind, crush, or rub the soil, so to speak, into the finest possible condition. Hence the plow must be narrow or its draft will be two heavy for two horses.

The *subsoil plow*, at present in use, is probably as near the correct form as can be devised, but the material of which it is constructed is objectionable. It should be remembered that this instrument is to be forced through the hard, compact subsoil, in many cases greatly compressed by the frequent passage of the plow and teams. The resistance and friction to be overcome is consequently very great. The wing also has a great weight of soil to lift in making its way at so great a depth. It would seem that the desideratum to be sought here is such a form and such material as would produce the least friction; instead, therefore, of making subsoil plows of clumsy form and of rough cast iron, they should be made of the best steel, and the form should be such as to offer the least resistance compatible with sufficient strength. The wing ought not to rise much from the horizontal—only so much as to disintegrate the subsoil as it passes. The standard should be of steel and the form which would seem to offer the least resistance should present the shape of an elipsis in its cross section. In other words, the upright portion, which attaches it to the beam, should be beveled to an edge in front and nearly so aft. Being made of steel, they can be made much lighter than those in common use; they would also take a better edge and keep sharp much longer. In the subsoil plow the point of resistance being lower, the beam should be made long to correspond, so that in this, as in all other plows, the line of draft should be at right angles with the angle of the horses' shoulders and pass through the point of attachment or clevis. This rule must never be lost sight of.

A modification of the old *shovel plow* is much used at the South, under the name of the *bull-tongue plow*, being longer and narrower in the iron than the shovel plow, as the name suggests. This instrument might be modified so as to form a very important instrument for deeply working corn and other crops in the early stages of their growth. This operation is frequently very desirable, particularly when the soil from much rain has become compact to a considerable depth. If this instrument were constructed with the metal point shaped something like a cultivator-tooth, but narrower and with a longer shank, or with a flange something like the wing of a subsoil plow on each side of it, but of course smaller and narrower, it would seem to be just the instrument for the purpose indicated, *i. e.* to mellow up the soil under the young plants for the small roots to spread themselves in. It might be necessary to add a bar to steady it, but it is thought it would run more steadily than the bull-tongue, even without this addition.

These are all the modifications of the plow

thought to be necessary to mention in a limited essay of this nature. It may be well to allude to the application of steam to the plow, as there is a general interest extant on this subject at present, and there is but little doubt but the time is not distant when this problem will be solved by the ingenuity of man.

The history of past inventions may be instructive on this subject. In this we find that when steam has been made to do the work of man or beast, it frequently occurs that a method of applying the power quite different from that before in use must be adopted to accomplish the end. Hence, a very ingenious inventor once remarked that, when he applied his mind to the invention of any labor-saving machine, he always tried to keep out of view the ordinary manner of doing the work, as it tended to circumscribe his efforts within a certain limit, and he generally found it necessary to do the work in some other way—frequently backwards.

It is probable that when an efficient steam plow is invented, it will be by some one comparatively ignorant of our common plow and its use, by studying *the thing required to be done*, without any fixed notions of *how* it is to be done.

Societies or individuals therefore might greatly hasten the time of its advent by offering large rewards for a cheap, efficient steam machine that would thoroughly stir and mix the soil to the greatest possible depth. Some ingenious mechanic, having no settled notions as to turning furrows, may invent some form of machine which shall do the work more after the manner of the spade, which is the nearest to perfection now known. The principle of revolving spades or diggers is more likely to be improved upon than that of drawing plows through the soil by steam.

It will be seen that simple suggestions are made; it would be presumption to speak of positive modifications when so much has already been written on this subject. In Stevens's Book of the Farm and in the American Farmer's Encyclopedia will be found articles on the plow, in which the matter is treated in detail. The object of the writer is rather to make suggestions which experience seems to point to as the direction of improvement.

The materials best adapted to the construction of the plow in the southwest are well defined by practice. The beam and handles can be made of the best white oak much cheaper than of iron, and they are light and durable; the share and cutter of wrought iron laid with the best cast-steel; the mould-board of steel or cast iron in preference to wrought. A steel mould-board takes a better polish, and consequently offers less resistance than any other kind. Well-polished cast iron is next in quality in this respect. It is generally more the defect in form than in material that prevents cast mould-boards from "scouring" well. The great cheapness and durability of the cast iron mould-board will bring them into general use. As to the construction of the plow, much may be said. The general description of the mould-board, which seems to approximate nearest to the true practical shape, is defined as "composed of straight lines in the direction of its length, with continually increasing angles to the line of the furrow, these lines being either straight or concave or horizontal sections of the mould-board." As the shape of the mould-board is of greater moment than any other thing belonging to the plow, it will be well to give it a passing notice. As has been before suggested, its length and slope must vary in plows for different kinds of work. As a means of making its general shape better understood, it has been described as a twisted wedge; the angles of the wedge and its length will give all the modifications of the mould-board according to the most approved theoretical shape, but practice shows that the friction falls upon different portions of the mould-board according to the difference of soils and the depth the plow is put into the ground. A little reflection will show that no uniform shape will meet every indication. Thus in light friable soils, where there is no adhesiveness to overcome, the "twisted wedge" may be the very shape required, being made steep or long and low, according to whether the design is to *turn over* or *mix* the soil in plowing; but in a tough grass sod, in addition to overcoming the gravity of the soil, there is the adhesiveness caused by the roots to be overcome, which has a tendency to throw the friction lower down upon the mould-board in proportion to the depth of the matted roots, compared with the depth of the furrow-slice; and this variation of the point of resistance is still greater if the soil is of a tenacious character. It would seem that a deviation from the rule by which most boards are sloped might be introduced to advantage; and for a tenacious clay sod, if the mould-board were elongated in its front and lower part and made a little more full just where it begins to rise from the horizontal, just at that point which first lifts the furrow-slice after it is severed, it would be better suited to the work than the theoretically true shape. There is a limit to the reduction of the angle of the mould-board, and this is marked by the increased friction caused by the greater surface offered by the easier inclined plane face of the mould-board. To attain to the most perfect form for all the soils and aims of plowing requires the careful use of the *dynamometer*. The writer's opinion is that no great advance will be made in the structure of the plow until a much more perfect instrument for measuring draft than we now have is invented, because the most desirable improvement in the plow is *diminished draft and increased depth of furrow*. No true judgment of a plow can be formed without this instrument; imperfect as it is, its use has already developed some facts which show that mathematical cal-

culations are at fault when applied to the draft of a plow. It has been demonstrated that, of several plows of similar appearance, working in the same soil, and doing equally good work, one will require double the power of the other.

The most complete set of experiments ever made to test the different constructions of plows was made by the late Mr. Pusey, President of the Royal Agricultural Society of Great Britain, a complete report of which is in the 8th volume of the Cultivator in connection with Mr. Clemons's report of the plowing match of Worcester, Mass. In Mr. Pusey's experiments it was ascertained that the rule generally laid down as to the increase of draft in proportion to the square of the depth of the furrow-slice was erroneous. This is demonstrated by the following experiments, in which he used the Scotch plow. The disparity of the figures is to the imperfection of the dynamometer:

At 5	inches in depth	the draft	was	322 lbs.
6	do.	do.	do.	308
7	do.	do.	do.	350
8	do.	do.	do.	420
9	do.	do.	do.	434
10	do.	do.	do.	560
11	do.	do.	do.	700
12	do.	do.	do.	700

In this case the draft at 12 inches should have been, according to the rule referred to above, 1,848 lbs. instead of 700 lbs. as found by actual experiment.

The improvement of the plow, as stated before, must be preceded by an improvement in the dynamometer. This instrument must be so improved as to be self-registering, and must record the actual amount of draft in all parts of the furrow and foot up in a sum total the power expanded in making a furrow of a given length. With such an instrument it will be an easy matter by a series of experiments to form such a plow as will give the greatest depth of furrow with the least draft. Without such an instrument all modifications of the form of the plow for this object are but little better than guess work.

The operation of plowing is generally considered so simple that any boy is equal to it who is large enough to hold the handles of the plow. No man who has observed the difference between good and bad plowing but will admit that there is an art in guiding and managing the plow at which but few farmers arrive. To constitute a good plowman a man must have something of a mechanical turn, and must understand the different objects in view in plowing the different kinds of soil for the succeeding crop. If there is any defect in the structure, form, or arrangement of the plow he should be capable of discovering it and correct or direct its correction so that the work may be performed in the best possible manner.

The plow should always run level so as to cut a furrow-slice of equal thickness and such a width that the share should cut it clear all but a small turning pivot strip to enable the mould-board to effectually invert the slice. This nice adjustment of the plow should be made by the proper arrangement of the points of resistance and those of force without allowing one force to neutralize another unprofitably in adjusting the draft for the purpose of making the plow run steady. These are points which require experience and close observation to learn, and in the absence of exact criterion to explain are seldom fully understood by plowmen.

In plowing sod land great care is requisite to lay the furrows even and regular, so that there shall be no faults, for, besides being unsightly and unworkable, these faults will greatly interfere with the management of the succeeding crop, and every time a plow or cultivator presses these breaks it cultivates the grass, and spreads it so that if there are many in the field, it becomes exceedingly foul from this cause.

In breaking up inverted sod land, which should be done the season after it is inverted, the object to be kept in view is the thorough mixing of the decomposed sod as well as any vegetable or mineral matter that may be on the surface, entirely and evenly through the entire depth of soil, turned over by the plow. To do this the furrows must be turned on edge, not inverted. The angle at which the furrow should turn will be governed by the amount of vegetable matter on the surface; if there is much of this (unless coarse corn-stalks for instance) the furrow slice must be inverted so far as to cover it and no more; if the surface is clean, the slice may stand rather more perpendicular. One thing must be borne in mind, that the different stratas of soil, when set on edge, or as near it as the case admits of, will be thoroughly mixed when stirred by the harrow, or by cross plowing, and thus become well prepared to afford nourishment to the succeeding crop. To illustrate: Suppose slices of apple, potato, turnip, and beet be laid one on the other, if you scrape the upper surface you reach but one kind; invert them and their relative position remains comparatively the same; you reach but one kind by scraping the surface; turn them on their edge and you cannot scrape the then upper surface without reaching all. This is the thing to be arrived at when plowing for the purpose of mixing the soil, or plowing it in such a position that it shall be well mixed when stirred. If the furrow slice were fully inverted at every plowing, manure might remain in the soil for years, without being of much benefit to the crop grown. The plowmen should understand the necessity of this thorough mixing and pulverizing of the soil; there is no operation of more importance than this; it is the object of plowing, except where vegetable matter has to be turned under to decompose preparatory to being mixed by the succeeding plowing. Plowing for the purpose of stirring the soil round the growing crop has

two objects in view: First, to produce a bed of light soil for the roots to ramble in search of food; and, secondly, to admit the air among the particles of soil to prepare the food for the plants. As the tendency of soil is to compact together by the action of water, and the mutual attraction of its particles, it is desirable to have it stirred as deep as possible as late in the season as the case will admit of; hence the practice is a good one of deep plowing as near the young corn as possible, without too much mutilation of the roots, and for this purpose it may be best to throw the earth from the plants with a turning plow and then throw it back again; thus fresh aerated soil is thrown within the reach of the young roots. As the season advances and the droughts of midsummer are to be expected, it is bad policy to endanger the roots by deep plowing, nor is it the best way to avert the effects of this drought. For this purpose the best method is to reduce the surface to fine dust as soon as possible. This may be done with a small roller, narrow enough to run between the rows of corn alternately with the cultivator. By stirring the soil deep, particularly if done with a turning plow, the evaporation is increased, while a coating of fine dry dust acts as a mulch and tends greatly to prevent it. Every time a crust is formed, either by rain or dew, it should be broken with the cultivator or crushed with the roller.

The plowman should observe the condition of the soil and the effects of plowing improperly, and be able to judge correctly when it is in the proper condition for that operation. If plowed when too wet its fertility may be injured for the whole season or longer. Rich clay soils may be rendered incapable of producing half a crop by breaking of when too wet. No plow should be put into a soil when it is so wet as to receive a polish from the mould-board, especially in the spring. All these points and many others must be matters of study and attention to him who intends to become a thorough plowman.

From the Country Gentleman.

Winter Care of Poultry.

We do not wish the reader of this article to infer from the heading, that the suggestions contained in it do not also apply to summer as well as winter, but only that in almost all latitudes, poultry require, in many important respects, much more attention in winter than at other seasons of the year. And perhaps the most important of all these, next to providing them with a suitable house, as mentioned in our last article, (page 45,) is a regular supply of animal matter. That it is indispensable to their health, and to their constant production of eggs, no one of much experience in this matter will deny. Every one will tell you that your fowls must have access to substances containing lime, from which to elaborate shells for their eggs, but hardly any one seems to think whence the elements of which the eggs themselves are composed, are to come. These must be furnished in the food, and therefore we must inquire what kind of food is suited to this purpose. The chief constituent of both the white and the yolk of the egg, is an organized substance called albumen; and nitrogen is one of the chief constituents of albumen. Therefore, it is plain, that if you want your hens to lay, you must feed them on substances containing nitrogen. The flesh and blood of animals are almost identical with albumen, and contain a considerable amount of nitrogen. But corn, and such other grains as can be economically fed to poultry, do not contain much nitrogen, though they contain the elements necessary for the production of fat. Oats have a much larger proportion of nitrogen than corn, and at the ordinary relative proportion of prices, are the more economical of the two. Poultry may be fattened on substances which do not contain a particle of nitrogen, as starch, sugar, and the fat itself of other animals, but they will not continue to lay. It is not, therefore, the fat, but *the muscle* and *the blood, liver*, the scraps which remain after trying lard, and tallow, &c., which are best adapted for food for hens; and of which a little given every day or two, when they cannot pick up insects and worms for themselves, will abundantly repay you in their increased production of eggs. Those scraps from the table which are often given to prolong the existence of some ugly raw-boned, snarling, sheep-stealing cur, would suffice for as many hens as ought to take the place of the aforesaid dog.

As to providing shells for your hen's eggs; old mortar, burned bones and oyster shells will furnish it—of course unslacked lime must not be given them. They are particularly partial to oyster-shell lime, probably because it may have a little flavor of the salt water; and we would here observe that while the salt itself is injurious to poultry, scraps of salt meat and fish are much relished by them, and after some observation and inquiry, we venture to say, productive of no bad results. Bones partly converted into charcoal and pounded fine, furnish both lime and nutriment. Such bones as can be easily mashed with a hammer as they come from the table, furnish a larger amount of oily matter than one who has never tried the experiment would suppose, while the fragments themselves, which the fowls will eagerly devour, contain phosphate of lime, the very thing that they need. Red peppers, onions, cabbage and celery leaves, chopped up, are all excellent articles of vegetable diet which fowls greatly need in winter as a change from their dry food. We do not advocate much feeding of warm and soft food, except an occasional change of boiled potatoes, (at something under a dollar a bushel,) because the digestive organs of fowls are not adapted to soft food. Corn may be parched, and its nutritive qualities thus

much increased, and if corn-meal is fed it can be mixed up with water, or with mashed potatoes, and then baked in rough cakes. Nor do we approve the plan of giving the fowls access to as much grain as they want at all times; they will be sure to suffer more or less, like some other bipeds, from a gluttony unrestrained by moral principle.

And we have another objection to these labor-saving machines for feeding and watering fowls, which is that they will be neglected *in other respects*. Instead of visiting your fowls regularly to see what they need, and what is their condition, you will fall into the very bad habit of leaving them to themselves, taking it for granted, that because they have water and grain, they are doing well enough. *When people take it for granted things are going right, that is generally the time they are going wrong.* Feed your fowls regularly, and *take time* to do it, not throwing the corn down in a heap for them to snatch up in two minutes, but scatter it as much as possible a little at a time. Our own experience agrees with that of most poultry breeders whom we have known, that an average of one gill of corn a day, half in the morning and half at night, with such scraps as may be thrown to them at noon, is sufficient to keep fowls in good laying condition. And though we have spoken of oats as containing more nitrogen than corn, we prefer corn, (if meat is occasionally given,) as the rule, and oats as the exception, chiefly because the fowls themselves seem to prefer it. One writer in the same breath, condemns corn as heating and producing only fat; and meat as unsuited to fowls, evidently overlooking the distinction between fat which contains no nitrogen, and fibre and blood which do.

Without a constant supply of fresh water, which some persons never think of providing, poultry will not thrive. Shallow earthen pans or those scooped out of stone, are better than wood; cast iron ones we prefer as more durable, and the rust taken up by the water is rather an advantage to the fowls. A few drops of assafœtida, kept in solution in a vial, poured occasionally into their water, is of great benefit, both as a stimulant and a prophylatic. In the above suggestions, intended solely for the inexperienced, we have endeavored to adhere to such principles of simplicity and economy as will make them easily available by all. H.

Ellicott's Mills, Md.

From the Germantown Telegraph.

Manuring---Fall or Spring.

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I have been much interested of late in the discussions, in various agricultural papers, upon the *application of manures*. While some advocate *surface manuring*, others are strong in its condemnation, and think manure should never or seldom be applied, unless almost immediately *plowed under*. Without pretending to point out which is the more correct method, I will mention a few practical facts, and leave your intelligent agricultural readers to entertain whatever opinions they may think best upon the subject, and draw their own conclusions. One recommendation I will, however, venture to make—Don't fail to get the manure on the ground in some way. It will do good in almost any way applied.

Your correspondent, "A Resident of Delaware County," is quite severe in his condemnation of *fall surface manuring*, and thinks the manure will be carried off into "mill dams" and "low lands." I admit, that in some situations this might be the case; but certainly no intelligent farmer would be willing to place his manure, in the season referred to, on such unfavourable locations; and the fact, that a loss may be sustained in such cases, is no argument that such applications would not prove beneficial on a more level surface. The objection generally made to *top dressing* or *surface manuring*, is the escape of ammonia by exposure to the air. If this is the main objection, and it certainly is the one mostly urged, I would remark, that the moment the heap of manure, either in your barn-yard or anywhere else, is disturbed, this process is commenced. If, then, you cart out your manure as speedily as possible to your field, spread it, and set your plowmen to *turning it under*, are not these volatile gases escaping? and can they be entirely secured, use what dispatch you may, particularly in very warm weather? Now I have seen various methods tried by the farmer to secure all the beneficial effects of this all-important article; and yet, after all, I believe *surface manuring in the fall*, and in favorable situations, even after the ground had become frozen, about as good a method as any other.

My favorite plan, if practicable, is to manure for corn as well as wheat; and by doing so my manure will go much farther, covering a larger surface of ground. All the manure usually left in the barn-yard in the spring, I generally let accumulate for wheat. After the yard is cleared in September, and I am done hauling out manure for wheat, I commence gathering into it again materials to make manure for top-dressing in the fall. It is not very long before I am ready again to commence hauling out gradually some very good manure for corn in the ensuing spring. I litter up the yard with straw and other materials thinly at different times, yard the milch cows, &c., over night; and, although your correspondent may think that "ninety-nine barn-yards out of every hundred in the latter part of November," would contain nothing valuable in this particular, I can assure him, *that just where I hauled the first load of manure in the fall*, I there had the best corn the ensuing season. With the manure accumulated in this way, and with that made in the stalls from eight or nine horses, several hundred loads of good

manure can be secured before winter, quite sufficient to cover twenty or more acres for corn.

I contend, Mr. Editor, that it is far better, if practicable, to haul the manure, at this season, direct to the fields and spread evenly over the ground, than to let it remain in the barn-yard to accumulate for the next crop of wheat. There is an amazing loss by fermentation and wastage during the hot months of summer, secure it as you may. It is wiser to let this be done in the field than in the heap in the yard.

I have, in some instances, plowed under almost immediately the manure hauled out in the fall; but I have always found the best success by letting it remain upon the surface and plowing under in the spring. I know that these sentiments are antagonistic to the opinions of many able writers, and particularly to those of the intelligent editor of the *American Farmer*. But facts are stubborn things, and hard after all to controvert.

I remember many years ago that I purchased several hundred loads of valuable manure, hauled it quite a number of miles, and had it spread as hauled, from early spring to late in summer, upon a clover sod, covering, with manure from my own barn-yard, about forty-five acres. The clover grew so as to hide the manure in a short time; after which all was turned under together by a skilful plowman. The result was, at the next harvest, *sixteen hundred and nine* (1609) bushels of as fine Mediterranean wheat as I ever saw gathered; and this too in the face of the assertions of many that the manure would be burned up and its effects destroyed by exposure to the heat of the sun. * * *

A Bucks County Farmer.

Deep Cultivation.

There is no doubt whatever that the English farmer is thoroughly awakened to the importance of deeper and more perfect tillage. While anxious after new sources of portable manure, grateful for the boon of the team-thrasher, and patiently waiting for improvements in reaping machines, he is more than ever alive to the advantage of being able to multiply mechanically the producing power of his fields. This beautiful island of ours cannot be stretched to a broader area; neither can we construct estates two stories deep, one gallery of ground upheld above another, like John Martin's Babylon gardens; yet every day is creating new demands for increased yields of agricultural produce. Thanks to the implement-makers, we are continually receiving fresh tools and machines to render tillage easier, and to aid us in adding to the four or six inches of immemorial staple an equal thickness of good soiling immediately underneath it, thus following the urban custom of gaining room vertically when it is denied to us in ground superficiencies. The spread of surface-cleansing by paring and grubbing, mainly brought about by a supply of cheap, efficient, and economically working-implements, is really wonderful; and with its extension has also widened the view of the farmer, as to the far greater amount of autumn-cleaning which would be worth doing had he but motive power enough for its performance. And there is no question that the approval and practice of deep tillage is also gaining ground. Intelligent agriculturists have not worked their teams in Herculean plowing of fifteen-inch furrows and crumbling stiff-clay sub-soils, without spreading the fame of their results; practice has not toiled or science preached in vain: and at the present time we believe the most valued boon to the farmer would be the placing in his hands a power that could make deep trench-work and a deep-stirring easy, instead of costly and somewhat dreaded operations. Prizes for plows to work twelve inches deep are no longer deemed preposterous; and as we come nearer and nearer to the successful hauling of draught implements by the steam-engine, the production and testing of the heavy-land plow becomes a closer struggle between the manufacturers, and a livelier subject of attention to the business farmer. In the columns of agricultural journals and periodicals we have continual exhortations to increase our teams, strengthen our whippletrees, and dip the share deeper; and the National Society's *Journal* gives us essays on the best methods of deepening the staple soil, and on the effects of the atmosphere upon the newly upturned earth. The Marquis of Tweeddale devises a most effective subsoil plow, and Mr. Stevens makes known to the world the extraordinary benefits on a large scale which have followed its laborious employment. Various inventors are favoring us with new sub-soilers, and Cotgreave's trench-plow seems to have come opportunely for the application of steam power to deep tillage.

There is no occupier who would not like to have his land in as fine tilth and as

clean as a garden, deeply worked, pulverized and enriched; only (as he will tell you) he must raise and be able to market green-grocer's and fruiterers' produce in order to make such perfect cultivation pay. As long as corn and roots and fodder are worth no more per acre than at present, there is a limit to the amount of tillage it will answer to bestow in growing them. Give him a power cheaper, stronger than that of horses, and still more than that of workmen; a power that eats only when at work, never wearies, and will accomplish the tillage wholesale at the right time, instead of being obliged to plod on bit after bit, often in unsuitable weather, and he will soon show what an augmentation of produce, and how many other advantages, follow a better style of culture.

Even in the virgin soils of America, this need for deeper and better husbandry is already felt. In a New York paper we read, "The great error of Indian-corn culture in the west is shallow plowing; to which we may add, continuing the crop upon the same land for a long term of years without rotation. There are tens of thousands of acres of corn land in the west that have never been plowed more than four inches deep, and the product is not over thirty bushels to the acre. The twelve inches beneath the four that have been disturbed is quite as good soil as the upper stratum, and only needs loosening to yield up its plant-food. On many of these acres, ten, fifteen, and twenty bushels may be added to the yield per acre by deep plowing alone. It will cost but a little more to do this; and the increased yield is nearly all profit to the farmer. Deep plowing would not answer to thin soils unless accompanied with high manuring; but every cultivator may safely go down an inch or two deeper than usual, and if his soil be prairie or bottom-land he may as well plow four or six inches deeper as two." The cost of cultivation, and the product of Indian corn per acre varies much in the several states. The average of the whole country, according to the last census statistics, was only about 25 bushels per acre; and for the western corn-growing states not far from 27 bushels per acre; the highest average, 40 bushels to the acre, was in Connecticut, a state in no wise remarkable for the fertility of its soil. According to statements in the Patent-Office Report, some crops of this grain reached 130 bushels per acre. Of 35 acres offered in Massachusets for premium, the average yield was 93 bushels per acre—the largest crop was 138½ bushels. These are certainly good yields to bring from the sterile bosom of New England soil; but they are far inferior to what might be raised upon the prairies and "bottom-land" of the West, with the same skill in cultivation. These results are mainly owing to deep plowing and thorough mechanical preparation of the soil, manuring, and after-treatment.

In addition, then, to our home experience, we have here a voice from across the Atlantic testifying to the economy and advantage of deeper working among the mineral riches constituting the soil. Let us hope that with these considerations before us, the exertions of inventors in the improvement of field implements and the accomplishment of steam-tillage will meet with the encouragement they will deserve.

[*Farmer's Magazine.*

The Weevil in Seed Wheat from the Patent Office.

Last week a friend brought to our office two samples of wheat, sent to him from the Patent Office, and labelled, "Large White Soft Tuscan Wheat, from Italy." Each sample was done up in the little bags commonly used, and apparently had not been opened since leaving Washington. They were contained in a small tin canister. On removing the lid, a disagreeable smell was perceived, and we saw a number of the *Calandra granaria*, or true grain-weevil, creeping on the surface of the bags. On opening the latter, as many weevils could be seen as there were grains of wheat. It was a mixed mass, in which it was almost doubtful which had the predominance. In bulk the wheat, however, was the greater; but in weight the bugs would, in all likelihood, turn the scale. What had at one time been truly beautiful wheat, was now *shorts* only, with the farina extracted through a little hole. *We did not find a single grain that could vegetate, but we found enough weevil to stock every granary and mill in the County of Cuyahoga.* Now this may appear a trivial matter to some, but it is really one of great interest. The grain weevil was rather rare in some parts of our country: it cannot be considered so now; for the Patent Office has unwittingly stocked the whole land with it. There is no doubt but the insect will obtain a foothold in our warehouses, mills and barns, and the amount of loss that will result

from this cause, cannot be computed. We are afraid that the agricultural department of the above Office, will never be able to do good enough to counterbalance this evil. From every quarter, we have heard complaints, of one kind and another, regarding the seeds sent out. Mr. Negley, of Pittsburgh, says that seeds of noxious weeds are frequently found in the packages. We have enough of those from Europe already.

There cannot be care enough taken to procure pure seeds for distribution. They should be perfectly clear of everything that is not strictly beneficial; but unfortunately there seems to be recklessness or incompetency somewhere, for things are done in a manner that if practiced by the employee of a merchant, would end in his summary ejection from office. But the servants of the people are too often the people's masters, and seem to care little whether the sovereigns have an interest in how things are done.

We do not like to find fault; but where the agricultural interests of our country are likely to be affected, we must complain. The interest of the farmers is more to us than that of all the office-holders in the United States. With the former we have everything in common; with the latter, nothing.

To those who receive packages of seed from any source, we say examine carefully, and if like the "Large White Soft Tuscan Wheat, from Italy," it contains an injurious insect, or even find it mixed with seeds of noxious weeds, if the latter cannot be separated, give it to the flames—it is safest there.—*Ohio Farmer*.

For the Southern Planter.

Mildew or Rust in Wheat.

I enclose two interesting papers on the subject of Mildew or Rust, copied from the 2d vol. of the "Memories of the Philadelphia Agricultural Society," which I hope you will find room for in the *Planter*. From the second paper I omitted a paragraph or two that did not seem to be of much importance. These two papers are upon a subject of vast moment to the wheat growers of the State. In this county, I am satisfied the wheat crop has been diminished this year fifty per cent. by rust. There has been nothing like it since the harvest of 1840. In that year, I remember, I did not cut more than the third of my crop.

I am not aware of any publication more satisfactorily accounting for the phenomenon of rust than "the thoughts upon mildew," albeit they are nearly a century old.

My observation concurs entirely with the views of the "New Englander," in reference to the circumstances under which rust occurs: that is, that it is produced by a sudden change from warm to cool weather. And this change of temperature in addition to the "stagnation of the juices," has a tendency to contract the sap vessels, thereby diminishing their size.—And thus two causes conspire to produce extravasation, one the stagnation of the sap, and the other the lessened capacity of the sap-vessels.

The remedies suggested are impracticable, except upon a very small scale, even if they were efficacious.

Now, whether the rust is merely the "extravasated sap of the plant dried by the sun," or a fungus, the seeds of which find in such sap a congenial "bed," I am not competent to determine. But as there seems to be a general concurrence in the fact that the bursting of the sap vessels, is an essential cause of rust, it must be evident that any process of culture, which by the application of mineral or other manures, or in any other manner, adds strength to the straw, by enabling the plant, while growing, to appropriate a larger amount of silex (sand) from the soil would have the effect of preventing extravasation of the sap, by enabling the vessels to resist the pressure upon them. It is well known that sand is always found in the straw of grain, and I believe in the cuticle or epidermis. In some species of cane and bamboo, it is found in considerable quantities. It appears to me, then, that if it were possible, by any application, to enable wheat to absorb a much larger quantity of sand, it would in a great degree prevent rust. What those applications ought to be—if there are any—I am not competent to state. It is a proper subject for scientific investigation.

I, however, will suggest a dressing of wood ashes or lime, as I have known spots which had accidentally been heavily dressed with those substances, entirely to escape rust, when other parts of the field were much injured. T.

Augusta Co., Sept. 22.

Letter from Timothy Pickering on Mildew.

WASHINGTON, Jan. 1, 1810.

Dear Sir:—In a conversation with you on mildews, I mentioned a short and very ingenious dissertation on the subject, which I had often quoted on like occasion, and which I promised to send you. It was published in a Boston newspaper in the year 1768; and the papers for the year being bound in a volume, it was fortunately preserved.

A few days since I received the enclosed copy transcribed at my request. It gives the only satisfactory solution of the phenomenon of mildews that I have ever met with. Sir Joseph Banke's discoveries (admitting their reality) did not abate my faith in the correctness of the "New Englandman's" theory. Sir Joseph's (to the naked eye) invisible seeds of *fungi*, find, in the extravasated juices of the leaves and stalks of grain, a *bed* adapted to their nature, in which they vegetate. Those seeds floating in the air, and striking against the clammy juices of those plants, would of course be there held fast and take root.

If you have visited the woods of Pennsylva-

nia in the spring, you must have noticed the *rusty* appearance of the sap (particularly I think of the sugar-maple) oozing from the stumps of trees felled not long before, and covering the tops and sides of the stumps. Of the same colour, you know, is the newly extravasated sap on the stalks of wheat and other grain when struck by the mildew.

You have seen many statements by American (and I believe British) agriculturists, of wheat being reaped while the grain was soft and milky, and the plants still green, or greenish; which nevertheless produced, if not a full sized, yet a tolerably plump kernel, and yielded a very fine and uncommonly white flour. It has been as often said by the agriculturists, that by such early reaping of grain, *on the first appearance of mildew*, you may obtain a valuable, if not an abundant crop; the sap in the stalks continuing in its natural course to the heads. whereas if the same grain remained uncut, the seed would be shrivelled, and often give chaff only instead of flour. How is this to be accounted for? The answer which has occurred to me, and which I will now state, while it furnishes an explanation of the declared fact, goes to confirm the theory of my countryman, in the paper enclosed. It is this.

The stalks of grain being severed from their roots, the source of the malady is cut off. The vessels of the stalks are no longer distended by a *superabundance* of sap ascending from the heated soil—they cease to receive any. The bursted vessels, through the wide breaches in which the sap, in its rapid ascent, was rushing, naturally close; and the sap already received into the stalks (further aided perhaps by dews) pursues its gentle course to the heads, and fills the grain.

The writer's remark, that grain in old fields which have often been dunged, is frequently mildewed, while that on new land escapes (for which, on his hypothesis, he assigns a natural reason,) comes in support of your opinion, that long and new dung is injurious to grain crops. I promised to give you an account of my experiments in cultivating the common field-peas, some twenty years ago at Wyoming, in which they were entirely free from bugs, but this I must postpone for the present.

I am, dear sir, faithfully yours,

TIMOTHY PICKERING.

Richard Peters, Esq.

[From a Boston newspaper, printed March 1768.]

SOME THOUGHTS UPON MILDEWS.—As the public are now, on all sides, calling upon every one to communicate his observations upon anything which relates to agriculture; perceiving in reading M. Duhamel's husbandry, that there are a great variety of opinions, about the *nature* and *cause* of *mildews* upon grain, even among the most celebrated gentlemen farmers of Europe; and desirous, if possible, to contribute my mite towards any useful discovery, I have ventured to show my opinion, founded on such observations as fully satisfy myself, as it appears to me perfectly to correspond with *facts;* and in a natural and easy way to account for every appearance and effect of that disorder in grain.

My fixed opinion then is and long has been [in which I since find I agree with the famous M. Chateau Vieux,] that the powder which forms the *rust*, caled *mildews*, is the extravasated juice of plants dried by the sun, upon the stalk.

My reasons are these:—1st. The grain, we see, receives no more nourishment after it is violently struck. 2d. On a careful inspection, it appears that some of these rusty blisters are actually under the outer coat or skin of the stalk, and do not appear to have any communication from without, others are only split in the middle, some more and some less, and the rust appears on the outside more or less according to the opening. 3d. The learned Mr. Tillet, (Duhamel tells us) with a good microscope, actually saw the juice issuing from these small openings, over which he still perceived some pieces of the membrane which imperfectly covered them. This, methinks, must give ocular demonstration. But the two former satisfied me, the second especially appeared demonstrative.

The true cause of this *extravasation* is next to be enquired into. This no writer that I know of has hinted. I take it to be this: *a sudden obstruction of the juices of the plant, by a very cool night, after several days and nights of very warm weather.*

By a continued heat, the earth is warmed to a great degree, and all nature invigorated; this occasions a great assent of the juices, so that every vessel is full (as in an animal of a plethoric habit when all know there is most danger of the vessels bursting,) a sudden cold evening at this critical season chills the tender stalk, and most where it is slenderest, and these brings on a stagnation.

But the earth being deeply warmed by the long and intense heat, not cooling so soon as the stalk, continues the violent ascent of the juices as before; and if there be an obstruction or stoppage above, in the slenderest part of the stalk, what must, what can be the consequence of this but an extravasation, or that the vessels burst?

That in fact mildews in New England always come in cool nights, after intense and continued heats, I am sure from near forty years observation, and from these symptoms I have often known a mildew prognosticated by observing persons, in the evening preceding. Such a cold, succeeding heat, every philosopher, and almost every man knows, will occasion a great dew. And this no doubt is the reason why this rust has been ascribed to the *dew* and called *meldew* or *mildew*. Whereas, I suppose, it

was the *cold*, properly speaking, which occasioned both; and that the *dew* had no other effect in occasioning the *rust* than, as by hanging on the stalk, it may increase the chill.

Another fact which, I think, confirms this hypothesis is this: that the *thin leaves* and *slenderest* parts of the stalk are always first affected; on the stalks the spots appear first just below the ear. Here the stalk being smallest and the vessels narrowest, is the first stoppage by the chill, as might be expected. And accordingly just below this the first eruption appears; and so lower and lower, till, without relief, it covers the whole, and entirely ruins the grain if not already filled.

It is another well known fact, that grounds in our new settlements are much less exposed to mildews than in our old plantations which have been often dunged. The reason of this is plain upon this hypothesis, for dung heaps are known in summer to receive and retain a much greater degree of heat than common earth.

There can be no doubt therefore, but that dunged lands do the same in proportion to the dung, especially the new laid upon them. And if so, it must occasion a more violent ascent of the juices, and so the stalk will proportionably be in more danger of bursting and of an extravasation of the juices, upon a sudden chill in the stalk.

Another fact commonly observed is, that *high grounds* are not so exposed to mildews as lower. The reasons are plain upon this hypothesis.

1st. Because there is not so much difference between the weather in the day and night upon high grounds, as in the lower.

2d. Because the greater *motion* of the air in the high land, may in some measure prevent the stagnation of the juices.

But most of these things are very hard to account for, upon any other hypothesis I have ever seen.

Upon this plan too a high wind *will* be likely to prevent a mildew; and accordingly, I think, they are never known to come in a windy night. though cold. And a *shower*, or a *rope* passed over the fields, at this time may do some service; as the washing and cleansing a sore on an animal, or as any kind of motion in case of stagnation of the blood and juices of our bodies.

But though I take this, for the reasons given, to be the true cause of what are called mildews, from the knowledge of which, it has been hoped some remedy might be investigated; yet here I must own my ignorance, and leave it to some more happy genius to bless mankind with a remedy, if providence permits any.

*   *   *   *   *

I would just hint at one or two things. 1st. If the unhappy night or nights can be prognosticated from the symptoms above mentioned, possibly a *rope* moving over the field, and stirring the grain all the night might be of service, though I think shaking off the dew in the morning can be of but little; or 2d. In the woods where brush is plenty, the burning of brush on the windward side, so that the smoke shall pass over the field, and soften the air, might very probably be of service.

*   *   *   *   *

But as our mildews in New England most commonly come about the beginning of July, the only thing we can depend upon at present, is the using every method to bring forward our grain as early as possible, that it may be full and ripe before the mildews come.

A NEW ENGLANDER.

For the Planter.

Corn-Shucking.

Mr. Editor,—In many parts of Virginia, it has for a long period been customary among some farmers to solicit assistance in shucking their corn in November and December, annually. The corn is hauled up and the proprietor, or his overseer, wants to get one, two or three hundred bushels of corn shucked during one night. To accomplish this object, the slaves for several miles around and upon adjacent farms are invited to attend, and to induce them to do so, they are notified, that they will receive a good supper and a plenty of whiskey. As might be expected there is a large assembly of negroes, a large amount of corn is shucked, many songs are sung, a hearty supper eaten, and a great deal of mean whiskey swallowed. Towards the conclusion of the frolic, quarrels and fights occur which sometimes terminate most disastrously. Many years ago my observation convinced me that these assemblies were improper, because they tended to corrupt and debase the slaves. I have never had one of these fashionable corn-shuckings, but have always had my corn shucked by my own slaves.

Unwilling that my slaves should be exposed to the liability to become involved in quarrels and fights by attending any corn-shucking elsewhere, I gave them strict orders never to go to one without my special leave. I directed my overseer to repeat these orders from time to time. Notwithstanding these precautions, a neighbour of mine invited my negroes some 12 or 15 years ago, (without the knowledge or permission of myself or overseer,) to attend a corn-shucking on his farm. Several of my negroes accepted the invitation. Corn was shucked, songs were sung and whiskey drank. Soon after, quarrels and fights took place. The result was that a young and valuable negro man of mine was killed on the spot by another negro who was drunk and who was the assailant. The latter was subsequently tried and condemned to be hung.

My negro man was killed when in the employment of my neighbour, and as he was thus employed without my leave and in disregard of my orders, I might have sued and would probably have recovered the estimated value of

the negro man. Although provoked at the conduct of my neighbour, I forbore a suit.

I have been prompted to make the foregoing remarks in consequence of having seen in a late number of the Richmond Dispatch that during the fall of 1857, a negro man was killed in Tennessee, at a corn-shucking, held on the farm of Mr. Jones, who had invited negroes in the neighbourhood to aid his hands in shucking corn. The negro who was thus killed, had attended the corn-shucking without the leave of his master, who sued Jones and *obtained judgment against him.*

I inclose the article from the Dispatch, and will thank you to insert it as a warning to all persons who are fond of corn-shucking assemblies, and who are apparently insensible to their evil tendency. Having lost one of my own negroes by the misconduct of a neighbour, and on many other occasions heard of quarrels and fights among the negroes assembled, I am more than ever opposed to this mode of having the work on the farm performed.

A Planter.

Important Decision.—A Mr. Jones, of Rutherford county, Tenn., held a corn-shucking last fall, and invited assistance from his neighbours. Among others, a negro came to the corn-shucking without his master's consent, and was killed in the course of the night by a drunken man, named Hagar. Hagar was sent to the penitentiary, and the owner of the negro sued Jones for the value of the negro, and obtained judgment, on the ground that he was on Jones' premises and in his employ without leave.

The Arabian Horse.

Interesting Account of the Genealogy of Arab Horses by Abd-el-Kadir.

We take from the *Moniteur de l' Armée* the following letter from Emir Abd-el-Kadir, in reply to one from General Daumas, directed to him, asking information concerning the genealogy of the horses of Sahara, or at least that which is attributed to them by the Arabs:—

A thousand praises to the only God!

To Him who always remains unalterable in the midst of the revolutions of this world.

To our friend General Daumas, health and mercy, and the blessing of God be with you, as the author of this letter wishes it, his mother, his sons, the mother of these, as many persons as compose this family, and all their friends and companions.

I have read your question, and I direct unto you my replies.

You ask of me information concerning the origin of Arabian horses, and you find me as a fissure of the earth dried by the sun, and which the rain cannot satisfy by the abundance which falls upon it.

Nevertheless, to satisfy, if it is possible, your thirst upon this subject, I proceed now to remount to the source whence the water is always most pure.

Know, then, that it being admitted among us that God created the horse with the wind, as Adam with the earth.

This is indisputable, and many prophets (health to them) have proclaimed the following:—

When God wished to create the horse, He said to the south wind' "I wish to form a creature out of thee—be thou condensed;" and the wind was condensed.

Afterwards came the angel Gabriel and took a handful of that matter and presented it to God, who formed of it a light brown or sorrel colored horse, *koummita* (red mixed with black), saying:—

"I have called thee horse (*ferass*)*—I have created thee an Arab, and I have given thee the color *koummita;* I have bound fortune upon the mane which falls over thine eyes; thou shalt be the lord (*sid*) of all other animals; men shall follow thee whithersoever thou goest; good for the pursuit as for the flight—thou shalt fly without wings; riches shall repose in thy loins, and wealth shall be made by thy intercession.

Afterwards he marked it with the sign of glory and of happiness, *ghaza* (a star shining in the middle of the forehead).

Do you wish now to know if God created the horse before man, or man before the horse? Hearken.

God created the horse before man, and the proof is, that man being the superior creature, God ought to have prepared for him whatever was necessary before He caused him to appear upon the earth.

"The wisdom of God manifests that He has created whatsoever exists upon the face of the earth, for Adam and his posterity."

Behold a testimony:—

* *Ferass*, horse; the plural is *kheiti*. The etymology of this word, say the learned, is the substantive *khetial*, which signifies pride. The Arab horses ought to be called so from the gracefulness of their march.

When God had created Adam, he called him by his name, and said to him :—

"Elect between the horse and *borak* †"

Adam replied :—"The most beautiful of the two is the horse ;" and God responded :

"Well, thou hast chosen thy glory and the glory of thy sons : while they exist my blessing shall be with them, because I have not created anything that can be more dear to me than man and the horse."

God also created the horse before the mare, and I believe the proof of this to be that the male is more noble than the female, and besides, more vigorous and enduring. Even when two may be of one species, the one is more impassionate than the other ; and it is the custom of the Divinity to create that which is strongest first. That which the horse desires most is the combat and the race ; for this reason it is preferable for war, because it is fleeter and more inured to fatigue than the mare; and because it partakes of all the feelings of hate and tenderness of its rider. The same thing does not happen in the case of the mare. Suppose a horse and a mare with similar wounds, such as ought to produce death ; the horse will resist until it conducts its master out of the field of battle ; the mare, on the contrary, will fall at the moment on the same spot in which it was wounded. There is no doubt whatever as to this, for it is a fact demonstrated by the Arabs ; I have frequently witnessed these cases in our combats, and I have myself experienced it.

Admitting this, we pass to another thing. Did God create the Arab horses before foreign ones (*beradine*), or these before the Arabs ?

As a consequence of my first reasoning, all must believe that he created primarily the Arab horses, inasmuch as they are incontestibly the most noble. On the other hand, the *berradines* are nothing but a species of a genus, and the Almighty has never created the species before the genus.

And, well—whence proceed the Arab horses of the present day ?

Many historians relate that from the time of Adam the horse, as all other animals—the gazelle, the ostrich, the buffalo and the ass—has lived in a wild state. According to those, the first person that, after Adam, mounted the horse, was Ishmael, the father of the Arabs. He was the son of our lord Abraham, the beloved of God. God taught him to call the horses, and when he did so they all assembled unto him ; he possessed himself of the most beautiful and the most fierce, and he tamed them.

But later, many of these horses tamed and employed by Ishmael lost their purity with time. Only one race was carefully preserved in all its nobleness by Solomon, the son of David, and it is that which is called *zad el rakeb* (the gift of the rider), to which all the Arab horses of our epoch owe their origin.

It is believed that some Arabs of the tribe of Azed went to the noble Jerusalem to congratulate Solomon on his marriage with the Queen of Sheba. Their mission being ended, they addressed unto him these words :—

"Oh, prophet of God ! Our country is very distant, our provisions exhausted : although thou art a great king, give unto us sufficient that we may return to the bosom of our family :—

Solomon caused a magnificent colt of the race of Ishmael to be taken from his stables, and he dismissed them, saying :—

"Behold the provisions with which you are to be refreshed upon the journey. When you are hungry search for wood, kindle a fire, mount your best rider on this horse, and arm him with a trusty lance. You shall scarcely have collected the wood and enkindled the fire ere you shall see him appear with the product of an abundant hunt. Go, and may God give you his protection."

The Arabs set forth upon their journey, and did in their first necessity whatsoever Solomon had instructed them, and neither zebras, nor gazelles, nor ostriches could escape them.

Enlightened, then, concerning the value of that animal—the present from the son of David—and being already in their country, they devoted themselves to their reproduction, guarding their matches, and thus they obtained this race, to which in gratitude they gave the name *zad-el-rakeb*.

This is the race whose fame was after-

† *Borak* is the animal which served to carry the baggage of Mahomet in his journeys across to heaven. It resembles a male, and is neither male nor female.

wards spread throughout the whole circumference of the world.

In fact, it was propagated in the East and West with the Arabs, who at a later time penetrated into the extremities of the West and of the East. Long before Islamism, Harmia Ahen Melock and his descendants reigned in the East during a hundred years, founding that Medina and Sakliachedad-Eben-Aad, and possessing themselves of all the country unto the Moghreb, where they built cities and harbors. Afrikes, who gave his name to Africa, conquered unto Tandja, (Tangiers), while his son Chamar possessed from the East unto China, entering the city of Sad, which he destroyed. Because of this, and from that time that place was called Chamarkenda, because *kenda* in the Persian language means "he has destroyed," whence the Arabs by corruption have drawn Sainarkanda.

After the birth of the religion of Islam, the new invasions of the Musselmen extended even more the reputation of the Arab horses in Italy, Spain, and also in France in which, without doubt, they left some of their blood. But that which above all caused Africa to be filled with Arab horses, was the invasion of Sidi-Okba, and afterwards the deeds of the fifth and sixth centuries of the Hegira. With Sidi-Okba, the Arabs had not done anything more than to encamp in Africa; while in the fifth and sixth centuries they came as colonies to instal themselves with their wives and their children, with their horses and their mares. It was in these last invasions that the Arab tribes established themselves on the soil of Algeria, especially the Mehall, the Cjendel, Oalad-Mahadi, the Donaonda, &c., &c., who were scattered over all parts, constituting the true nobility of the country. These same invasions transplanted the Arab horse unto Soudan; and we can say with reason that the Arab race is one in Algeria as in the East.

Thus, then, the history of the Arab horses can be divided into four epochs:—

1. From Adam to Ishmael.
2. From Ishmael to Solomon.
3. From Solomon to Mahomet.
4. From Mahomet to ourselves.

It is conceived, nevertheless, that the race of the principal epoch having been divided into many branches, has necessarily suffered modifications, in consequence of the climate, food, and more or less care—in the same manner as those of the human species have suffered. The color of the coat has also changed under the influence of the same circumstances—the experience of the Arabs having proved that in localities in which the ground is stony the horses are generally gray, and in those places which are white, *ard Bedu*, the greater part are white—observations the correctness of which I have demonstrated myself.

I have now nothing more to do than to satisfy another of your questions.

You ask me by what signs the Arabs know if a horse is noble—if he is a drinker of the air?

Behold my answer:

The horse of pure origin is distinguished among us by the tenuity of the lips and of the inferior cartilage of the nose; by the dilitation of the nostrils; by the dryness of the flesh which enwraps the veins of the head; by the elegance of its shape; by the softness of the skin; by the width of breast, the thickness of the articulations, and dryness of the extremities.

According to the traditions of our predecessors, they are also to be recognised by moral indications much more than by external signs. By these you can prejudge the race; by the moral indications you can arrive at a knowledge of the care which had been observed in the matches, [breeding] of the interest with which crossing had been avoided.

The horses of race do not know effeminacy. The horse is the most beautiful of the animals, and its moral, in our idea, ought to correspond, not degenerate, to his physical character. The Arabs have such a conviction of this, that if a horse or a mare gives any incontestible proof of extraordinary quickness, of notable abstinence, of rare intelligence, or affection for the hand that gives it its food, they will make every possible sacrifice to draw a race from it, being persuaded that the qualities wich distinguished it will be manifested in its breed.

We believe, then, that a horse is truly noble, when to a beautiful conformation it unites valor and fierceness, and when it evinces pride in the smoke of powder and the combat.

This horse will esteem its master, and

will scarcely ever permit any one to mount it except him.

It will not urinate while it is traveling.

It will not eat the leavings of any other horse.

It will not disturb the clearness of the water with its front legs when it passes over it.

By its hearing, by its sight, and by its smell, it will know how to preserve its master from the thousand accidents which often take place in the chase and in war.

And in short, sharing the sensations of sorrow and of pleasure of its rider, it will aid him in the fight, struggling with him in all parts, and will always make common cause with him *(ikatelma Rakeb-hon.)*

See, now, the evidences of the purity of a race.

We have marvellous histories concerning the qualities of horses; the result of all is that the horse is the most noble of all creatures after man—the most patient and the most useful. It is supported with little, and if it is regarded in the point of strength, we shall find that it is at the head of all the other animals. The most robust ox can raise a quintal; but if this weight is put upon it, it moves with difficulty, and cannot run. The horse supports a man, a vigorous rider, with a standard and his arms, and what is more, without eating or drinking. With its aid the Arab is able to save what he possesses, to cast himself upon the enemy, to follow his track, to fly, and to defend his liberty. Suppose him rich with all the wealth that makes the happinesss of life, nothing is able to protect him save his horse.

Do you comprehend now the intimate affection of the Arabs for the horse? It is equal, and no more, to the services which it renders them. To it they owe their joys, their victories; and for this they prefer it to gold and precious stones. During paganism they estimated it by interest, and only because it procured for them glory and riches; but since the prophet spoke of it with the greatest praises, this instinctive love was transformed into a religious duty.

One of the first words which tradition attributes to him, are those which, according to it, he directed to the various tribes of Yemen, who presented themselves to accept his dogmas and to offer to him, in sign of submission, five magnificent mares which belonged to the five different races that were then in Arabia.

It is related that when Mahomed came fourth from his tent to receive those noble animals caressing them with his hands, he expressed himself in these terms:—

"That ye may be blessed—children of the wind."

Afterwards, at a later time, the Ambassador of God (Rassoul-Allah) adds:—

"He who maintains and cares a horse for the cause of God shall be counted in the number of those who do alms by day and by night, in secret or in public. He shall be rewarded, his sins shall be remitted, and fear shall never shamefully enter into his heart."

I now pray God that he might give you eternal prosperity. Preserve me in your friendship. The wise Arabs have said:—

Riches can be lost.

Honors are but a shadow, which easily disappear.

But true friends are an inextinguishable treasure.

He who has written these lines with a hand which death must one day wither, is your friend, the poor before God.

SID-EL-HADI, ABD-EL-KADEE,
BEN-MAH-HYEDDIN.

P. S.—In order that you might understand my correspondence, I ought to give you a notice.

The name of *ferass* is not only applied to the male of the horse, as is the custom in Algeria, but it designates in the same manner the male and the female. If it is desired to indicate the mare, it is necessary to say *ferass* female, and if one speak of a horse, he ought to say *ferass* male. At least that is the custom among the Arabs.

(*Arabes sahh.*) Regularly, the mare is called *hadira*, and the horse *hassan*."

Feeding Stock in Winter.

We copy in this week's paper an article from a New York Journal on the subject of *winter feeding*, and particularly on the question whether the cutting of fodder fine *will pay*.

The speakers are generally well known as practical men, and giving their opinions after trials of artificial modes of feeding.

Some of the speakers allude to what has been recently published in the Albany Cultivator, in regard to the effect of cutting corn butts fine and mixing with them something valuable in order to induce cows and other stocks to swallow the whole.

Dr. Waterbury particularly alludes to the statement that after many months the corn butts have been found stored up in the intestines and undigested. He lost a young cow by this method of feeding.

We have never recommended the practice of cutting corn butts fine and mixing something good with them to induce cattle to swallow the whole mass. Indeed, we have long doubted whether it is not better to let cattle chew their food and eat it slowly, than to make artificial messes to be swallowed in haste.

It is true that cows will yield more milk on cut feed and slops than on the best of hay alone, and when the hay is not of so good quality as to induce cattle to fill themselves with that alone, it may be profitable to cut the hay fine and mix meal of some kind with it—for if it is not cut it cannot be well mixed.

The simplest food is best for all animals, and they will live longer, and continue more healthy on such, than on any artificial feeding. Variety of food is useful, and we see how cattle thrive on the variety of herbage which is found in all our summer pastures. But cut feed with much grain to make it go, is a different thing. Cows that are kept on the richest food never live long. There are not many that will stand two quarts of Indian meal per day for a great length of time.

We ought to contrive to have a greater variety of dry fodder through the winter. Corn husks are of much importance, and all farmers who keep stocks of cattle ought to have a good supply. This they can have by planting an extra acre of corn for the single purpose of saving the stalks for winter feed. One acre will yield a great supply without a large quantity of manure. Still it may be a better course to plant for the purpose of securing the corn as well as the husks.

A little more time spent in increasing the manure heap, and in stirring the ground between rows of corn, will aid farmers to procure winter food quite as much as the growing of acres of roots which must be wed at much greater cost than is usually expended on corn.

Oat straw, wheat and barley straw, are all good to increase the variety of winter feed—and all these may be profitably mixed with husks at the time of harvesting. All may become a little mouldy, but eating this is no worse than eating mouldy cheese, which many prefer to that which is green or dry.

Buckwheat straw is another article, which was formerly burnt in the field as soon as it was threshed, in order, as it was said, to prevent the scattering of the seeds among the manure, in the solemn fear that when once scattered over a farm it could never be rooted out. It was thought to be a greater nuisance on a farm than thistles or witch-grass.

But look around you, farmers, and find any wild fields of buckwheat if you can. This grain never flourishes without cultivation, and you may exterminate it if you wish, as easily as you may rye or wheat.

The straw of buckwheat is really worth something as a variety for cattle in winter. They will eat some of it at any rate, but they will eat more when you mix it with husks at the time of husking. People err more in letting this grain stand late in the field than in letting corn or rye stand late. They are deceived by the late blossoms which are not to be regarded. Look to the main chance, and cut early.

Massachusetts Ploughman.

Oil From a New Source.

An important branch of manufacturing at Marseilles is the production of oil from the peanut, and for making soap it is said to be preferable to the other seed oils. The shell is not removed, but is crushed with the kernel. In the process of extracting the oil, the nuts, are subjected to several operations. They are first passed through a series of crushing cylinders, and then are crushed again under millstones. After being thus treated, they are placed in wrappers made of hogs' or goats' hair, and then put into hydraulic presses, which express the oil, and it flows off into a bucket. In the centre of the bucket rises a tube nearly to the height of the rim, which tube passes through the bottom of the bucket, and fits as a socket upon a large tube or pipe, from which the oil is constantly being pumped into very large casks. The use of the tube in the bucket is to cause the heavier parts of the oil, together with all refuse matter, to sink to the bottom, while none but the purer parts of the oil pass into the large tube or pipe. There is no process of clarification. The oil remains in the casks from six to ten days without being touched, at the end of which time it is found to be clear. The nuts are crushed and pressed three times, at each pressure that the cake is formed. The oil resulting from the first pressure of the nut is used for eating; that from the second pressure for burning; and that from the third for making soap.

Eight Hundred Sheep Poisoned.

The *Gardener's Chronicle* states that Mr. Bird, of Benton, England, had a flock of eight hundred and sixty-seven sheep which were dipped in a chemical solution to destroy ticks, lice, etc., and turned out to grass. It is supposed the solution was washed off by a shower of rain and eaten by the sheep, as in four days only 26 out of the whole flock remained alive.

Hints about Candles.

A little inquiry into the nature of flame, teaches some important facts in the manufacture of candles, not always well understood.

1. Flame is perfectly *transparent.* It is true we do not see common objects through it, because the bright light of the flame eclipses all the fainter light of objects beyond. The transparency is proved by the fact that the flame of a candle never casts a shadow, when placed between another candle and the wall; and also by the fact that an oblong or flat flame gives precisely as much light seen edgewise or with its broad side.

2. The brightness and combustion are all at the *outside.* The interior consists merely of the *gas*, which is constantly manufacturing from the tallow, the heat and light being at the outer surface of this portion of the gas, when it is in contact with the oxygen of the air. This may be proved by holding a piece of paper for a moment across the flame, when the outer or hot portion will burn a ring in the paper, leaving the interior uninjured. Or it may be shown by quickly and dexteriously thrusting the point of a phosphorous match into the interior of the flame, where it will not be lighted, the wood merely being burned off by the outer heat.

3. These facts explain why an unsnuffed candle gives so little light. The large black snuff hides the light of a large part of the transparent flame—the consumption of tallow being always the same in either case, according to experiment.

4. For the same reason, a large, loose wick, by giving a broad black snuff to the candle, produces a great loss of light for the amount of tallow consumed. A smaller, compactly twisted wick, is more agreeable to the eye and more economical. The large wick produces a tall flickering blaze, often throwing off smoke. The smaller, compact wick, on the other hand, gives a more compact flame, which never flickers nor throws off smoke. Hence the latter is less injurious to the eyes. The large hot wick often causes the tallow to run down the candle, although, all candles are liable to this difficulty if carried about.

A small wick feeds the melted tallow to the flame more slowly than a large one, and consequently the small wick candles burn the longest. In consequence of the black snuff, imperfect combustion, and waste by smoke, a large wick gives but little more light than a small one, yet, experiments show that the tallow is consumed about twice as fast, being nearly in the proportion of 35 to 60 or 70 minutes in the consumption of an inch of candle, while the amount of useful light from the latter is nearly equal to that of the former—saving nearly 50 per cent. Therefore, a family which consumes yearly twelve dollars worth of the first described sort, need not require more than about seven dollars of the latter.

The best candles we have tried, had a wick made of four cords of common cotton pack-thread, twisted together for a candle three-fourths of inch in diameter. This will give an idea of the proper size of the wick, yet it may without inconvenience be smaller. It is much better, both for the eyes and for convenience and economy, to burn two candles at once with small wicks and a clear steady light, than one only with a large one, giving off a large, dancing, smoking flame.

All these remarks are intended to apply to the use of good, pure tallow—a bad material will fail in any case.—*Abridged from Country Gentleman.*

From the Canadian Agriculturist.

Evils of Over-feeding Stock.

For many years grave objections have been repeatedly urged against the practice of the excessively artificial system of feeding cattle, sheep, and pigs for the exhibition of fat stock, especially the Smithfield Christmas Show in London. An elaborate and scientific report on rigid examinations of certain animals which took premiums at the last Smithfield Exhibition, has just been published, and which cannot fail to awaken general attention to this subject. The report is the production of Mr. Gant, Assistant Surgeon to the Royal Free Hospital, whose knowledge of general and comparative anatomy, and well known familiarity with the use of the microscope entitles his statements to respect. His microscopical observations are confirmed by the celebrated Professor Queckett, Curator of the Royal College of Surgeons.

After describing the living appearance of certain prize animals at the Show, such as cattle, sheep, and pigs, some of them owned by the Prince Consort and the Duke of Richmond, all monstrously fat, and exhibiting great difficulty in breathing, Mr. Gant observes:—"Throughout the exhibition one circumstance particularly arrested my attention. It was the size of the animals compared with their respective ages. The bullocks averaged from two to three years; the pigs and sheep were about one year old. When I contrasted the enormous bulk of each animal with the short period in which so much fat or flesh had been produced, I certainly indulged in physiological reflection on the high pressure work against time which certain internal organs, as the stomach, liver, heart, and lungs must have undergone at such a very early age. I therefore resolved to follow up those animals to their several destinations, and to inspect their condition after death." Mr. Gant was admitted to the slaughter houses when the gold and silver prize bullocks, heifers, pigs, and sheep, that remained in London, were killed, and after carefully removing the heart, lungs, liver,

&c, he made dissections of these organs, and provided faithful drawings of both their visible and microscopical appearances. Our space will only admit of a slight reference to their symptoms.

In the sheep, the hearts of several specimens were found in an unnatural, that is, unsound condition; the external surfaces very soft, greasy, and of a dirty brownish yellow colour, motted with yellow spots of fat imbedded in the substance of the heart. Under the microscope the process was readily detected of the muscles being changed into, or overlaid by fat. The lungs were flabby, with numerous tubercles, and their function, or power of action, greatly diminished. Similar observations apply to the pigs, whose circulating system suffered serious interruption, indicated by the dark, livid liver. In horned cattle, the left ventricle of the heart had, in the several instances examined, been more or less converted into fat, having a yellow, soft, and greasy appearance. The intestines, also, exhibited a fat, putty-like mass, from an inch to an inch and a half thick, in various parts of their surfaces. The worst feature of high breeding, early maturity, and consequent aptitude to fatten, appears to be under our modern stimulating system to convert the most important organ of life and health into a mass of fat. The stomach may indeed prepare food for the production of blood, and the lungs and kidneys may purify it of excrementitious matter, but these departments of the blood-factory are only subsidiary to the heart, whose special duty it is to propel the vital fluid to the most distant recesses of the body, that every part may be nourished and renovated. Yet I found the great central organ more than any other damaged. * * * This material (fat) may itself be regarded as the superfluous food with which the animal had been gorged. It was first deposited in all loose parts of the body, these being most adapted for its accumulation, beneath the skin, and around the kidneys, stomach, intestines, and heart. At length, in such localities, the fat invaded the muscles themselves, by passing in between the fibres. Thus is produced the streaked appearance of meat,—a condition which, within due limits, in no way interferes with the health of the animal, nor impairs the nutritive quality of its flesh for food. On the contrary, fat itself is a necessary constituent of the most nutritious food; and by no provisions can a due proportion of this ingredient be secured so effectually as when it is thus intermixed with the substance of the muscles themselves. Thus each mouthful of meat contains a wholesome and agreeable proportion of fat; but beyond those limits an animal cannot be fattened without impairing its own health, and also its nutritive value as human food. Let an animal be fed beyond the limits compatible with health, and the superfluous fat is no longer confined to the interstices of muscular fibres, but actually invades, and eventually superseded them."

It may be said that there is but little danger of over-fattening live stock in Canada, as our animals, generally, are not distinguished for too high breeding, nor are they crammed and pampered with oily and stimulating food. We have seen, however, particularly at our butchers' Christmas show of meat in Toronto, both cattle, sheep, and swine, fattened to a degree that can scarcely be considered compatible with the health of the animals, or the wholesomeness of their meat for human food. Both sheep and cattle, although in low condition in spring, will often upon our pastures in summer and autumn, lay on fat rapidly, sufficiently so for all useful and practical purposes, without recourse to artificial stimulants.

The report thus concludes:—"Under the present system the public have no guarantee, and are not insured the best, if indeed the cheapest food. The bulky withers of a fat bullock are no criterion of health, for his fat, tubular back may conceal the revolting ravages of disease. All this alone can be discovered by an inspection of the animal's interior after death. The flesh of animals which has been produced by organs themselves diseased, is itself also necessarily deteriorated, and ought not to be regarded as prime samples of human food. These facts will be best understood by pathologists, but they also come home to the understanding, and certainly to the stomachs of the people."

A Miraculous Corn.

The "Michigan Farmer" says: "There are new circulars being issued which proclaim the Wyandotte Prolific Corn the wonder of the age. Its yield is terrific—twenty stalks from a single grain, and one hundred and twenty-eight bushels of shelled corn a common product. This is all certified to by respectable parties, and of course we have to believe it. It must be so, or it would not be put in print!—especially by those who have the corn for sale at the rate of $4 enough to plant an acre. Wyandotte corn is a new variety of white corn, said to have come originally from California, where it was cultivated by a tribe of Indians of that name. It stools out more than any other variety, and if the accounts are correct, it yields remarkably. Mr. Wm. Cochrane of Corunna, Shiawaesse county, the agent of Messrs. Penfield, Burrall & Co., nurserymen, Lockport, N. Y., called upon us on the 25th, and showed us an ear of this corn, which he had bought at Evansville, Indiana. It was one of fourteen which had grown from a single grain. The ear was handsome in shape, about eleven inches long, and the grains of corn were large, white, flat, compact and regular. The question is, will this corn ripen as far North as this? It did not ripen in New York

this past season, but it was an unusually wet, cold fall, and spring. The Wyandotte corn certainly is worth trying, but don't depend upon it for a crop.

Essay, on the Physical Properties of Soils as Affecting Fertility.

BY SAMUEL W. JOHNSON,

Professor of Analytical and Agricultural Chemistry in Yale College, and Chemist to the State Agricultural Society of Connecticut.

The fertility of a soil depends upon no one cause or class of causes. The farmer who is acquainted with the results of generations of agricultural experience but who has not mastered the principles of science; the chemist who regards only the revelations of his reagents; the geologist who merely traces the soil to its original rock; the physicist who sees in it only a theater for the play of mechanical forces—can each suggest some of the conditions of fertility, and can account for the prodnctiveness of this and the barrenness of that soil; but none of them can give accurate rules universally applicable to the valuation or improvement of soils in general. There is hardly another subject of such wide connection and extent. It involves the whole range of the physical sciences; Geology, Chemistry, Botany, Physiology, Meteorology, Mechanics, Hydrodynamics, the sciences of heat, light and electricity, all are intimately related to it. That labors to illustrate such a topic should have only recently met with any degree of success is not strange; neither are we to wonder that our present knowledge of it is very limited, or that the opinions of those best qualified to judge upon it, are divided.

The function of the soil is two-fold, first to serve as the station or home of the plant, and second, to supply it with food.

In nature these two offices are not by any means separable. The same materials that form the bed in which the plant preferably fixes itself, in which it extends its roots most naturally, and developes itself most healthfully, also contribute food to its growth.

The study of the physical characters of soils involves the investigation of the first of these functions, that of their chemical characters the investigation of the second. There are soils whose texture, situation, degree of moisture, &c., are apparently faultless, which are nevertheless unproductive; they lack some necessary form of food for the growing plant. There are other soils which reveal by chemical analysis the presence of every substance needed by the plant as food, and prove to contain them all in sufficient quantity, and yet are not productive, or not regularly so; they may give a fair crop one season and entirely fail the next. These soils have some physical defect which nullifies their excellencies of composition

An advanced, and rational or scientific system of farming, keeps in view both the chemical and the physical qualities and wants of the soil, and reclaims and improves the lands under its control, by a judicious combination and succession of appropriate chemical and physical agencies. Thus in England and Scotland, countries which are the world's example in agriculture, the first thing that is done with a soil by a thorough farmer, is to inquire into its physical condition, and to correct the same when necessary and practicable. The British farmer will have his soil just so dry, just so deeply tilled, just so finely pulverized, before he feels warranted in putting seed into it, or manure upon it. In this country, however, where nature has favored us with a climate in some respects better, comparatively little attention is bestowed on the mechanical preparation of the ground, the usual routine of ploughing six inches, more or less, harrowing and rolling a traditional number of times, being all that generally succeeds the removal of forests and of stones. Beyond this simple preparation of the ground, which is uniform for nearly all soils and all crops, the farmer if he go farther, expends his strength in efforts to raise the fertility of his fields by chemical means—by the application of much and many manures.

It is quite plain, on a moment's thought, that physical improvements of the soil deserve to come first in order of time, because where they are needed, and not supplied, chemical improvements (manures) must fail to give the full effect proper to them. It is of the utmost importance for the farmer to be able to judge accurately how favorable to his purposes are the physical characters of any soil he proposes to occupy, and to know how to maintain these qualities of a new soil in their original excellence.

The knowledge of the physical conditions which determine the fertility or barrenness of soils is an indispensable preparation to the study of the value and action of manures, and it is utterly impossible in practice, to derive adequate return from fertilizers, unless the soil either originally possesses, or has been brought into a proper physical state.

These reasons have induced the writer to attempt presenting the subject anew, in the light of the latest and fullest investigations, and he is confident that it is possible thus to write one of the most practically useful chapters of agricultural science.

I. *The fineness of the Particles* of a soil greatly influences its fertility. On the surface of a block of granite only a few lichens and mosses can exist; crush the block to a coarse powder and a more abundant vegetation can be supported on it; if it is reduced to a very fine dust and duly watered, even the cereal grains will grow and perfect fruit on it. Thus two soils may have the same chemical composition, and yet one be almost inexhaustibly fertile, and the other almost hopelessly barren. There are sandy soils in the Eastern states, which without manure yield only the most meagre crops of rye or buckwheat; and there are sandy soils in Ohio which without manure, yield on an average 80 bushels of Indian corn per acre, and have yielded this for twenty to fifty years in unbroken succession. According to David A. Wells, (Am. Jour. of Science, July, 1852,) these two kinds of soil yield very similar, practically identical results on chemical analysis, so far as their inorganic ingredients are concerned. What is the cause of the difference of fertility? Our present knowledge can point to no other explanation than is furnished by the different fineness of the particles. The barren sandy soils consist in great part of coarse grains, while the Ohio soil is an exceedingly fine powder.

It is true as a general rule, that all fertile soils contain a large proportion of very fine or impalpable matter. How the extreme division of the particles of the soil is connected with its fertility is not difficult to understand. The food of the plant must enter it in a state of solution, or if undissolved, the particles must be smaller than we can discover with the best optical aids, because the pores of the roots of plants are not discernible by any microscope. The mineral matters of the soil must be dissolved or diffused in water. The rapidity of their solution is in direct proportion to the extent of their surface. The finer the particles, the more abundantly will the plant be supplied with its necessary nourishment. In the Scioto Valley soils, the water which is transpired by the crops, comes in contact with such an extent of surface that it is able to dissolve the soil-ingredients in as large quantity and as rapidly as the crop requires. In the coarse grained soils, this is not the case. Soluble matters, (manures) must be applied to them by the farmer, or his crops refuse to yield handsomely.

Again, it is obvious that the finer the particles of the soil, the more space the growing roots have in which to expand themselves, and the more numerously are they able to present their absorbent surfaces to the supplies which the soil contains.

Other advantages of fine soils will appear in the progress of this essay.

II. We will discuss *the power of the soil to absorb or condense gases or vapors.* With regard to this subject we have no actual observations on soils, of any great value. Those we do possess were made forty years ago by Schübler, then a teacher in Fellenberg's school at Hotwyl in Switzerland, and will be presently adduced.

In the first place may be considered those facts of science which bear upon the question before us. It is found that many solid bodies are able to condense gases upon their surface, or within their pores. Freshly burned box-wood charcoal thus absorbs ninety times its volume of ammonia gas, thirty-five of carbonic acid and nine of oxygen. Copper, iron, lead, platinum, and probably the other metals, also condense gases upon their surfaces. This condensation is scarcely perceptible in plates of solid metal; but when by chemical means these metals are produced in a very finely divided state, as fine powder or sponge, their surface attraction becomes manifested to an extraordinary degree. There is then, a physical attractive (adhesive) force which is exhibited with greater intensity, the greater the surface of the body possessing it. It is manifested by different bodies in very unlike degree, and

is exerted with various energy towards different gases.

Bodies which absorb the gas or vapour* of water are called hygroscopic. This property of a soil is of the utmost agricultural importance, because: 1st—it is connected with the permanent moisture which is necessary to vegetable existence, and, 2d—since the absorption of water-vapour determines the absorption of other vapours and gases.

In the following table from Schübler we have the results of a series of experiments carried out by that philosopher, for the purpose of determining the absorptive power of different kinds of earths and soils. He found that *dry* earths did not absorb oxygen; this is because being in constant contact with air they were saturated with this gas before the experiments begun; when, however, the soil was wet with water, an absorption was found to occur. The first column of figures gives in thousandths the quantity of oxygen absorbed by the moist soil during thirty days; the second column the quantity, also in thousandths, of moisture absorbed by the previously dried soil, in twenty-four hours.

Quartz sand, ...	1	0
Gypsum, ...	1.7	1
Lime-sand, ...	4	3
Plough land, ...	10.5	23
Clay soil, (60 per cent. clay,)	6	28
Slaty marl, ...	7	33
Loam, ...	7	35
Fine Carbonate of lime, .	7	35
Heavy clay soil, (80 per cent. clay,)	9	41
Garden mould, (7 per ct. humus,)	11.5	52
Pure clay, ...	10	49
Carbonate of Magnesia, (fine powder,)	11	82
Humus, ...	13	120

It is seen, that with two exceptions, the rate of absorption for oxygen and for watery vapor increases in the same order. It is probable then that the oxygen was to some degree absorbed and held in solution by the water with which the earth was moistened. The two exceptions are soils rich in vegetable matter, (humus.) They absorbed proportionally more oxygen for a chemical reason; it united with their carbon and hydrogen, forming carbonic acid and water. Probably the larger share of the absorption of oxygen, in most cases, was due to this combination of it with the elements of humus, or with the protoxyd of iron, the latter passing thereby into the peroxyd; but in case of magnesia and carbonate of lime the absorption must have been a surface condensation.

An obvious practical result follows from the facts expressed in the above table, viz: that sandy soils which have little attractive force for watery vapor, and are therefore dry and arid, may be meliorated in this respect, by admixture with clay, or better with humus, as is done by green manuring. The table gives us proof that gypsum does not exert any beneficial action in consequence of attracting moisture. Humus, or decaying vegetable matter, it will be seen, surpasses every other ingredient of the soil in absorbing moisture. This is doubtless in some degree connected with its extraordinary porosity or amount of surface. How the extent of surface alone may act, is made evident by comparing the absorbent power of carbonate of lime, in the two states of sand, and of an impalpable powder. The latter it is seen, absorbed twelve times as much vapor of water as the former. Carbonate of magnesia stands next to humus, and it is worthy of note that it is a very light and fine powder.

Finally, it is a matter of observation that "silica and lime in the form of coarse sand, make the soil in which they predominate so dry and hot that vegetation perishes from want of moisture; when, however, they occur as fine dust, they form too wet a soil, in which plants perish from the opposite cause." *Hamm's Landwirthschaft.*

III. *Permeability of the soil to water, including percolation and capillarity.*—A soil is permeable to water when it allows that liquid to soak into or run through it. To be permeable is of course to be porous. On the size of the pores depends its degree of permeability. Coarse sands and soils which have *few* but *large* pores or interspaces, allow water to run through them readily—water *percolates* them. When instead of running through, the water is largely absorbed and held by the soil, the latter is said to possess great *capillary power;* such a soil has *many* and

* The term *Gas* is applied to permanently aeriform bodies—*Vapor* to such as readily assume a liquid state. The difference is only relative.

minute pores. The cause of capillarity is the same surface attraction which has been already mentioned.

When a narrow vial is partly filled with water, it will be seen that the liquid adheres to its sides, and if it be not more than one-half inch in diameter, the surface of the liquid will be curved or concave. In a very narrow tube the liquid will rise to a considerable height. In these cases the surface attraction of the glass for the water neutralizes or overcomes the weight of (earth's attraction for) the latter. The pores of a sponge raise and hold water in them, in the same way that these narrow (capillary*) tubes support it. When a body has pores so fine (surfaces so near each other,) that their surface attraction is greater than the gravitating tendency of water, then the body will suck up and hold water, will exhibit capillarity; a lump of salt or sugar, a lamp wick, are familiar examples. When the pores of a body are so large, (the surfaces so distant) that they cannot fill themselves, or keep themselves full, the body allows the water to *run* through or to *percolate*.

Sand is most easily permeable to water, and to a higher degree, the coarser its particles. Clay on the other hand is the least penetrable, and the less so, the purer and more plastic it is. In an agricultural sense, sand implies those coarse particles or grains whose form can be defined by the eye, while all the finer impalpable portions of a soil, though consisting in part of very fine grains of sand, may be called clay. The chemist, however, understands by clay a definite chemical compound. The distinction should be borne in mind. Sand, i. e. grains of quartz, or undecomposed rock, may be made so fine, that with the admixture of a little true clay, it opposes the passage of water to a considerable extent.

When a soil is too coarsely porus, it is said to be leachy or hungry. The rains that fall upon it, quickly soak through, and it shortly becomes dry.* On such a soil, the manures that may be applied in the spring, are to a great degree washed down below the reach of vegetation, and in the droughts of summer, plants suffer and perish from want of moisture.

* From *capillus* the Latin word for hair, because as fine as a hair, (but a hair is no tube, as is often supposed.)

When the texture of a soil is too fine, its pores too small, as happens in a heavy clay, the rains penetrate it too slowly; they flow off the surface, if the latter be inclined, or remain as pools for days and even weeks, in the hollows.

In a soil of proper texture, the rains neither soak off into the under earth, nor stagnate on the surface; but the soil always (except in excessive wet or drought) maintains the moistness which is salutary to most of our cultivated plants.

What part the *capillarity* of the soil plays in the nutrition of the plant may now be noticed in detail.

If a wick be put into a lamp containing oil, the oil by capillary action gradually permeates its whole length, that which is above as well as that below the surface of the liquid. When the lamp is set burning, the oil at the flame is consumed, and as each particle disappears, its place is supplied by a new one, until the lamp is empty or the flame extinguished.

Something quite analogous occurs in the soil by which the plant (corresponding to the flame in our illustration) is fed. The soil is at once lamp and wick, and the *water on the soil* represents the oil. Let evaporation of water from the surface of the soil or of the plant, take place of the combustion of the oil from a wick, and the matter stands thus: Let us suppose dew or rain to have saturated the ground with moisture, for some depth. On recurrence of a dry atmosphere with sunshine and wind, the surface of the soil rapidly dries; but as each particle of water escapes, (by evaporation) into the atmosphere, its place is supplied (by capillarity) from the stores below. The ascending water brings along with it the soluble matters of the soil, and thus the roots of plants are situated in a stream of their appropriate food. The movement proceeds in this way so long as the surface is dryer than the deeper soil. When by rain or otherwise, the surface is saturated, it is like letting a thin stream of oil run upon the apex of the lamp wick, no more evaporation into the air can occur, and consequently there is no longer any ascent of water; on the contrary, the water by its own weight penetrates the soil, and if the underlying ground be not saturated with moisture, as can happen where the subterranean fountains yield a meagre supply, then capillarity will aid

gravity in its downward distribution. The water of the soil holds in solution the food of the plant—those portions at least which are absorbed by the roots. From the leaves of growing plants there is perpetually going on an enormous evaporation. Calculations founded on experiments of Hales and Saussure demonstrate that from an acre of sunflowers, each plant occupying four square feet of ground, there occurs during four months growth, the evaporation of four and a half millions pounds of water. This water comes from the soil and passes through the plant. All the mineral matters and a portion of the organic bodies, which feed the plant, are carried into it by this water. So long as evaporation goes on from the surface of the soil, so long there is a constant upward flow of saline matters. Those portions which do not enter vegetation accumulate on or near the surface of the ground; when a rain falls they are washed down again to a certain depth, and thus are kept constantly changing their place with the water which is the vehicle of their distribution. In regions where rain falls periodically or not at all, this upward flow of the soil water often causes an accumulation of salts on the surface of the ground. Thus in Bengal, many soils which in the wet season produce the most luxuriant crops, during the rainless portion of the year become covered with white crusts of saltpetre. Doubtless the beds of nitrate of soda that are found in Peru have accumulated in the same manner. So in our western caves, the earth sheltered from rains, is saturated with salts—epsom salts, glauber salts and saltpetre or mixtures of these. Often the rich soil of gardens is slightly incrusted in this manner in our summer weather; but the saline matters are carried into the soil with the next rain.

It is easy to see how, in a good soil, capillarity thus acts in keeping the roots of plants constantly immersed in a stream of water or moisture that is now ascending, now descending, but never at rest, and how the food of the plant is thus made to circulate around the organs fitted for absorbing it.

The same causes that maintain this perpetual supply of water and food to the plant, are also efficacious in constantly preparing new supplies of food. The materials of the soil are always undergoing decomposition, whereby the silica, lime, phosphoric acid, potash, &c., of the insoluble fragments of rock, become soluble in water and accessible to the plant. Water charged with carbonic acid and oxygen, is the chief agent in these chemical changes. The more extensive and rapid the circulation of water in the soil, the more matters will be rendered soluble in a given time, and other things being equal, the less will the soil be dependent on manures, to keep up its fertility.

No matter how favorable the structure of the soil may be to the circulation of water in it, no continuous upward movement can take place without *evaporation*. The rapidity of evaporation depends upon several causes, which will be individually noticed. One of the most important is:

IV. *The retentive powers of the soil for water.*—The following tables by Schübler illustrate the peculiarities of different soils in this respect. The first column gives the *per cents* of water absorbed by the completely dry soil. In these experiments the soils were thoroughly wet with water, the excess allowed to drip off, and the increase of weight determined. In the second column are given the *per cents* of water that evaporated during the space of one hour from the saturated soil spread over a given surface.

Quartz sand, ...	25	88.4
Gypsum, ...	27	71.7
Lime sand, ...	29	75.9
Slaty marl, ...	34	68.0
Clay soil (sixty per cent clay,)	40	52.0
Loam, ...	51	45.7
Plough land, ...	52	32.0
Heavy clay, (80 per cent clay,)	61	34.9
Pure gray clay, ...	70	31.9
Fine carbonate of lime, .	85	28.0
Garden mould, . . . -	89	24.3
Humus, ...	181	25.5
Fine carbonate of magnesia,	256	10.8

It is obvious that these two columns express nearly the same thing in different ways. The amount of water retained increases from quartz sand to magnesia. The rapidity of drying in the air diminishes in the same direction.

The want of retentive power for water in the case of coarse sand, is undeniably one of the chief reasons of its unfruitfulness. The best soils possess a medium retentive power. In them, therefore, are

best united the conditions for the regular distribution of the soil-water, under all circumstances. In them this process is not hindered too much either by wet or dry weather. The retaining power of humus is seen to be more than double that of clay. This result might appear at first sight to be in contradiction to ordinary observations; for we are accustomed to see water standing on the surface of clay, but not on humus. It must be borne in mind that clay, from its imperviousness, holds water like a vessel, the water remaining apparent; but humus retains it invisibly, its action being nearly like that of a sponge.

One chief cause of the value of a layer of humus on the surface of the soil doubtless consists in this great retaining power for water, and the success that has attended the practice of green manuring as a means of renovating almost worthless shifting sands, is in great degree to be attributed to this cause. The advantages of mulching are explained in the same way.

Carbonate of magnesia, it is seen, far surpasses every other material used in Schübler's trials. It retains two and a half times its weight of water, and loses the same very slowly on evaporation.—The opinion has been advanced that this excessive attraction for water is one of the causes of the barrenness of certain soils that abound in this ingredient, and may explain why some soils have been permanently injured by heavy applications of a highly magnesian lime.

This is the proper place to notice :—

V. *The shrinking of soils on drying.*—This shrinking is of course offset by an increase of bulk when the soil becomes wet. In variable weather we have therefore constant changes of volume occurring. Soils, rich in humus, experience these changes to the greatest degree. The surface of moors often rise and fall with the wet or dry season, through a space of several inches. In ordinary light soils, containing but little humus, no change of bulk is evident. Otherwise, it is in clay soils that shrinking is most perceptible; since these soils only dry superficially, they do not appear to settle much, but become full of cracks and rifts. Heavy clays may lose one-tenth or more of their volume on drying, and since at the same time they harden about the rootlets which are imbeded in them, it is plain that these indispensable organs of the plant must thereby be ruptured, during the protracted dry weather. Sand, on the other hand, does not change its bulk by wetting or drying, and when present to a considerable extent in the soil its particles being interposed between those of the clay, prevent the adhesion of the latter, so that, although a sandy loam shrinks not inconsiderably on drying, yet the lines of separation are vastly more numerous and less wide than in purer clays. Such a soil does not "cake," but remains friable and powdery.

Marly soils (containing carbonate of lime) are especialy prone to fall to a fine powder during drying, since the carbonate of lime, which like sand, shrinks very little, is itself in a state of extreme division, and therefore more effectually separates the clayey particles. The unequal shrinking of these two intimately mixed ingredients, accomplishes a perfect pulverization of such soils. Prof. Wolff, of the Academy of Agriculture, at Hohenheim, Wirtemberg, states that on the cold heavy soils of Upper Lusatia, in Germany, the application of lime has been attended with excellent results, and he thinks that the larger share of the benefit is to be accounted for, by the improvement in the texture of those soils which follows liming. The carbonate of lime is considerably soluble in water charged with carbonic acid, as is the water of a soil containing vegetable matter, and this agency of distribution in connection with the mechanical operations of tillage, must in a short time effect an intimate mixture of the lime with the whole soil. A tenacious clay is thus by a heavy liming, made to approach the condition of a friable marl.

VI. *The relation of the soil to heat* are of the utmost importance in affecting its fertility. The distribution of plants in general is determined by differences of mean temperature. In the same climate and locality, however, we find the farmer distinguishing between cold and warm soils.

The temperature of the soil varies to a certain depth with that of the air; yet its changes occur more slowly, are confined to a narrower range of temperature, and diminish downward in rapidity and amount, until at a certain depth a point is reached where the temperature is invariable.

In summer the temperature of the soil

is higher in day time than that of the air; at night the temperature of the surface rapidly falls, especially when the sky is clear.

In temperate climates, at a depth of three feet, the temperature remains unchanged from day to night; at a depth of 20 feet the annual temperature varies but a degree or two; at 75 feet below the surface, the thermometer remains perfectly stationary. In the vaults of the Paris Observatory, 80 feet deep, the temperature is 50° Fahr. In tropical regions the point of nearly unvarying temperature is reached at a depth of one foot.

The mean annual temperature of the soil is the same as, or in higher latitudes, a degree above that of the air. The nature and position of the soil must considerably influence its temperature.

The *sources* of that heat which is found in the soil are two, viz: first, an internal one, the chemical process of oxydation or decay; second, an external one, the rays of the sun.

The heat evolved by the decay of organic matters is not inconsiderable in porous soils containing much vegetable remains; but this decay cannot proceed rapidly until the external temperature has reached a point favorable to vegetation, and therefore this source of heat probably has no appreciable effect one way or the other on the welfare of the plant. The warmth of the soil, so far as it favors vegetable growth, appears then to depend exclusively on the heat of the sun. The circumstances which favor or hinder the transmission or accumulation of the sun's heat, are accordingly worthy of minute consideration.

METHODS BY WHICH HEAT IS COMMUNICATED.

1. *Radiation of heat.*—When we approach a hot body we perceive its high temperature without touching it; heat streams from it in all directions. This heat passes into the air and other surrounding bodies; their temperature rises and that of the heated body falls; there is thus manifested a tendency to equalization of temperature, and such a state is finally reached, after which no more change of temperature is observed except some hotter or colder body be introduced. In the day the sun radiates heat towards the earth, and the latter becomes warmer; at night the earth radiates heat into the planetary spaces, and itself grows colder. All bodies are capable of radiating heat, but they possess this property in very different degrees.

The experimental results on this subject lead to no very definite conclusions. It seems, however, that the porosity, or state of division of the surface of a body, has the principal influence on its radiating power. The less dense the surface, the greater its radiating power. Radiation seems to take place not merely from the surface, but also from a little distance beneath it.

2. *Absorption of heat.*—In our treatises on natural philosophy, there is much apparent confusion on this subject. Absorptive power is often stated to be connected with the *color* of a body. It is, however, the fact that the radiating and absorptive power of a body for heat are absolutely equal. That body which absorbs heat most readily, radiates it also most readily, and *vice versa.* It must be understood, however, that bodies may differ in their power of absorbing or radiating *heat of different degrees of intensity.* Lampblack absorbs and radiates heat of all intensities in the same degree. White-lead absorbs heat of low intensity (such as radiates from a vessel filled with boiling water) as fully as lampblack, but of the intense heat of a lamp it absorbs only about one-half as much.—Snow seems to resemble white-lead in this respect. If a black cloth or black paper be spread on the surface of snow, upon which the sun is shining, it will melt much faster under the cloth than elsewhere, and this too if the cloth be not in contact with, but suspended above the snow. In our latitude every one has had opportunity to observe that snow thaws most rapidly when covered by or lying on black earth. The reason is that snow absorbs heat of low intensity with greatest facility. The heat of the sun is converted from a high to a low intensity, by being absorbed and then radiated by the black material. But it is not color that determines this difference of absorptive power, for indigo and prussian blue though of nearly the same color, have very different absorptive powers. So far, however, as our observations extend, it appears that dark-colored soils usually absorb heat more rapidly, and that the sun's rays have least effect on light

colored soils. This topic will be recurred to.

3. *Reflection.*--Bodies exposed to radiant heat may *reflect* it to a great extent. This is the case with polished metals, while glass is a poor reflector. Reflection is opposed to absorption.

4. *Transmission.*—Radiant heat may also be *transmitted* through bodies precisely in the way that light is. Rock salt transmits 92 per cent. of the heat that falls upon it; alum allows only 12 per cent. to pass, while blue vitriol intercepts radiant heat totally; it is so to speak, opake to heat.—On the other hand black glass, which is opake to light, allows considerable heat to pass through it. This kind of transmission is instantaneous and must be distinguished from

5. *Conduction.*—This is a slower process, and consists in the passage of heat from particle to particle of a solid substance. Conduction is destroyed by interruption of contact. Metals conduct heat most rapidly, while earthy matters have but a small conducting power. Liquids and gases conduct heat least of all. Porous bodies, like feathers, wool, cotton, &c., which enclose much air in their interstices, are therefore among the poorest conductors. Soils generally, must therefore rank among poor conductors, although it is probable that there are considerable differences among them. Humus, and soils rich in decaying organic matters, are doubtless slower conductors of heat than dense clays, but to my knowledge we have no precise experiments on this subject.—Mr. Hutchinson in an investigation of building materials, found that if we assume the conducting power of slate to be 100, that of soft chalk is 56, of gypsum 20, of sand 19.

6. *Convection.*—Though liquids and gases are almost perfect non-conductors of heat, yet it can diffuse through them rapidly, if advantage be taken of the fact that by heating they expand and therefore become specifically lighter. If heat be applied to the upper surface of liquids or gases they remain for a long time nearly unaffected, if it be applied beneath them, the lower layers of particles become heated and rise, their place is supplied by others, and so currents upward and downward are established, whereby the heat is rapidly and uniformly distributed. This process of convection can rarely have any influence *in* the soil. What we have stated concerning it, shows, however, in what way the atmosphere may constantly act in removing heat from the surface of the soil.

VII. *The relations of water to heat.*—The soil consists not merely of mineral and vegetable matter—not merely of clay, sand and humus—but it is always more or less penetrated with water. The relations of this universally diffused liquid to heat, are therefore of the utmost importance in understanding the conditions of fertility.

Three states of water.—Water may exist in three states--solid, liquid and gaseous. In each of these forms it has a separate significance in connection with our subject, and in its passage from one of these states to another, phenomena are occasioned which have great influence on vegetable production.

It is a matter of common observation that water exposed to the air in a shallow vessel, rapidly decreases in bulk, and finally disappears; it evaporates, it becomes invisible vapor or steam, and passes into the air. The higher the temperature to which the water is exposed, the more rapidly is this conversion accomplished. On the other hand, when a glass of cold water is brought into a warm, moist atmosphere, or held over the spout of a boiling tea-kettle, a deposition of water takes place on the cold surface; the vapour condenses, liquefies. Thus, by exposing water to great cold it freezes, solidifies, becomes ice; by elevating the temperature of a piece of ice, it becomes first liquid and then gaseous; by cooling vapor, it passes into the liquid and finally into the solid form. Temperature and pressure are the influences that affect the condition of water. The first of these alone needs lengthened consideration here

LIQUEFACTION—VAPORIZATION—LATENT HEAT.

When a piece of ice is placed in a vessel, whose temperature is increasing, by means of a lamp, at the rate of one degree of the thermometer every minute, it will be found that the temperature of the ice rises until it attains 32°. When this point is reached, it begins to melt, but does not suddenly become fluid; the melting goes on very gradually. A thermometer placed in the water, remains constantly at

32°, so long as a fragment of ice is present. The moment the ice disappears, the temperature begins to rise again as before, at the rate of one degree per minute. The time during which the temperature of the ice and water remains at 32°, is 140 minutes. During each of these minutes one degree of heat enters the mixture, but is not indicated by the thermometer—the mercury remains stationary; 140° of heat have thus passed into the ice and become hidden, *latent*, at the same time the solid ice has become liquid water. The difference then between ice and water consists in the heat that is latent in the latter. If we now proceed with the above experiment, allowing the heat to increase with the same rapidity, we find that the temperature of the water rises constantly for 180 minutes. The thermometer then indicates a temperature of 212° (32 + 180,) and the water boils. Proceeding with the experiment, the water evaporates away, but the thermometer continues stationary so long as any liquid remains. After the lapse of 972 minutes, it is completely evaporated. Water in becoming steam, renders therefore still another portion, 972° of heat latent. The heat latent in steam is indispensable to the existence of the latter. If this heat be removed by bringing the steam into a cold space, water is reproduced. If, by means of pressure or cold, steam be condensed, the heat originally latent in it becomes sensible, *free*, and capable of affecting the thermometer. If, also, water be converted into ice, as much heat is evolved and made sensible as was absorbed and made latent. It is seen thus that the processes of liquefaction and vaporization are *cooling* processes; for the heat rendered latent by them must be derived from surrounding objects, and thus these become cooled. On the contrary, solidification, freezing, and vapor-condensation are *warming* processes, since in them large quantities of heat cease to be latent and are made sensible, thus warming surrounding bodies.

From these facts we are able to understand certain natural phenomena, whose influence on vegetation has been recognized from the earliest times.

How does the earth maintain its temperature—What are its relations to the sun's heat—What is dew?—These are questions we now come to consider.

The earth has within itself a source of heat, which maintains its interior at a high temperature; but which escapes so rapidly from the surface, that the soil would be constantly frozen but for the external supply of heat from the sun.

The direct rays of the sun are the immediate cause of the warmth of the earth's surface. When the sun shines most directly upon the earth, it is warmest, as at summer mid-day. In a winter midnight we have the greatest cold. The temperature of the soil near the surface changes progressively with the season; but at a certain depth the loss from the interior and the gain from the sun compensate each other, and as has been previously mentioned, the temperature remains unchanged throughout the year.

During a summer day the heat of the sun reaches the earth directly, and it is absorbed by the soil and the solid objects on its surface, and also by the air and water. But these different bodies, and also the different kinds of soil, have very different ability to absorb, or become warmed by the sun's heat. It has before been mentioned that air and water are almost incapable of being warmed by heat applied above them. Through the air especially, heat radiates without being scarcely absorbed. The soil and solid bodies become warmed according to their individual capacity, and from the air receives the heat which warms it. From the moist surface of the soil goes on a rapid evaporation, which renders latent a large amount of heat, so that the temperature of the soil is not rapidly but gradually elevated. The ascent of water from the sub-soil to supply the place of that evaporated, goes on as before described. The liquid water of the soil has combined with (rendered latent) a vast amount of heat therefrom, and passed as gaseous water (vapor) into the air. When the sun declines the process diminishes in intensity, and when it sets, the reverse takes place. The heat that had accumulated on the surface of the earth radiates into the cooler atmosphere and planetary spaces, the temperature of the surface rapidly diminishes, and the air itself becomes cooler by convection. As the cooling goes on, the vapor suspended in the atmosphere begins to condense upon cool objects, while its latent heat becoming free hinders the too sudden reduction

of temperature. The condensed water collects in drops—it is dew; or in the colder seasons it crystalizes as hoar frost.

The special nature of the surface of the soil is closely connected with the maintenance of a uniform temperature, with the prevention of too great heat by day and cold by night, and with the watering of vegetation by means of dew. It is, however, in many cases only for a little space after seed time, that the soil is greatly concerned in these processes. So soon as it becomes covered with vegetation, the character of the latter determines to a certain degree the nature of the atmospheric changes. In case of many crops, the soil is but partially covered, and its peculiarities are then of direct influence on the vegetation it bears. Among these qualities the following remain to be noticed:

1. *The color of the soil.*—It is usually stated that black or dark colored soils are sooner warmed by the sun's rays than those of lighter color, and remain constantly of a higher temperature so long as the sun acts on them. An elevation of several degrees in the temperature of a light colored soil, may be caused by strewing its surface with peat, charcoal powder or vegetable mold. To this influence may be partly ascribed the following facts.—Lampadius was able to ripen melons even in the coolest summers, in Friberg, Saxony, by strewing a coating of coal dust an inch deep over the surface of the soil. In Belgium and on the Rhine, it is found that the grape matures best when the soil is covered with fragments of black clay slate. Girardin found in a series of experiments on the cultivation of potatoes, that the time of their ripening varied eight to fourteen days, according to the color of the soil. He found on August 25th, in a very dark humus soil, twenty-six varieties ripe; in sandy soil twenty; in clay nineteen; and in white lime soil, only sixteen. It is not difficult to assign other causes that will account in part for the results here mentioned; there seem to be no accurate and extensive observations on this point. That dark soils may actually attain an increased temperature of three to eight degrees over light colored soils, is a matter of direct observation.

2. *Rapidity with which the soil cools and warms.*—Schübler found that different soils heated to the same point required different times to cool down through a given number of degrees. In the following table are given his results, lime sand being assumed as 100.

Lime sand,	100.
Slate marl,	98.1
Quartz Sand,	95.6
Potter's clay,	76.9
Gypsum,	73.8
Clay loam,	71.8
Plough clay land,	70.1
Heavy clay,	68.4
Pure gray clay,	66.7
Garden earth,	64.8
Fine carb. lime,	61.3
Humus,	49.0
Magnesia,	38.0

It is seen that the sandy soils cool most slowly, then follow clays and heavy soils, and lastly comes humus. It must be remembered that the experiments were instituted on dry soils, i. e., artificially deprived of water, and hence do not apply to the soil in its natural state, in which water is rarely absent.

As to the rapidity with which various soils become warmed by the heat of the sun or of the day, no observations of any agricultural value have been instituted to my knowledge. It is easy to speculate upon this topic. The rapidity of cooling appears to stand in direct connection with the lightness and porosity of the soil; such qualities favor radiation, and the loss of heat by the circulation of the inclosed air. Such soils also, in nature, enclose a considerable amount of water, and in them capillary action is strongest in raising supplies from the sub-soil. On account of their porosity, this water is constantly evaporating, and therefore by extracting from them the heat necessary to vaporization, their temperature is speedily reduced. For the same reason moist soils rich in humus, can warm but slowly in the sun's rays. Sandy soils retaining little water, evaporation is less active in reducing their temperature. The surfaces of the grains of sand are glassy and smooth, they therefore radiate poorly, though this depends of course on the *degree* of fineness and smoothness. Clays stand in the middle of the scale.

3. *The degree of moisture present* is of great influence on the temperature of the soil. All soils when thoroughly wet seem to be nearly alike in their power of absorb-

ing and retaining warmth. The vast quantity of heat needful to gratify the demand of the vapor that is constantly forming, explains this. From this cause the difference in temperature between dry and wet soil may often amount to 10° to 18°. According to the observation of Dickinson made at Abbot's Hill, Herts, and continued through eight years 90 per cent. of the water falling between April 1st and October 1st, evaporates from the surface of the soil; only 10 per cent. finding its way into drains laid three and four feet deep. The total quantity of water that fell during this time, amounted to about 2,900,000 lbs. per acre; of this more than 2,600,000 evaporated from the surface. It has been calculated that to evaporate artificially, this enormous mass of water, more than seventy-five tons of coal must be consumed.

Thorough draining, by loosening the soil and causing a rapid removal from below, of the surplus water, has a most decided influence, especially in spring time, in warming the soil, and bringing it into a suitable condition for the support of vegetation.

It is plain then that even if we knew with accuracy what are the physical characters of a surface soil, and if we were able to estimate correctly the influence of these characters on its fertility, still we must investigate those circumstances which affect its wetness or dryness, whether they be an impervious sub-soil, or springs coming to the surface, or the amount and frequency of rain-falls, taken with other meterological causes. We cannot decide that a clay is too wet or a sand too dry, until we know its situation and the climate it is subjected to.

The great deserts of the globe do not owe their barrenness to necessary poverty of soil, but to meteorological influences—to the continued prevalence of parching winds, and the absence of mountains to condense the atmospheric water, and establish a system of rivers and streams.—This is not the place to enter into a discussion of the causes that may determine or modify climate, but to illustrate the effect that may be produced by means within human control, it may be stated that previous to the year 1821, the French district Provence was a fertile and well watered region. In 1822, the olive trees which were largely cultivated there were injured by frost, and the inhabitants began to cut them up root and branch. This amounted to clearing off a forest, and in consequence the streams dried up, and the productiveness of the country was seriously diminished.

4. *The angle at which the sun's rays strike a soil* is of great influence on its temperature. The more this approaches a right angle the greater the heating effect. In the latitude of England the sun's heat acts most powerfully on surfaces having a southern exposure, and which are inclined at an angle of 25° and 30°. The best vineyards of the Rhine and Neckar, are also on hill-sides, so situated. In Lapland and Spitzbergen the southern side of hills are often seen covered with vegetation, while lasting or even perpetual snow lies on their northern inclinations.*

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* Malaguti and Durocher have made some observations on the temperature of soils which have come to my knowledge since the above was written. They found that the temperature of a garden soil, just below the surface, was on the average 6° Fahr. higher than that of the air, but that this higher temperature diminished at a greater depth. A thermometer buried four inches indicated a mean temperature only 3° above that of the atmosphere. Besides the garden earth just mentioned, which had a dark gray color and was a mixture of sand and gravel containing but little clay, with about five per cent. humus, the thermometric character of the following soils were observed, viz: a grayish-white quartz sand, a grayish brown granite sand, a fine light-gray clay (pipe clay) a yellow sandy clay, and finally four lime soils of different physical qualities.

The influence of a wall or other reflecting surface upon the warmth of a soil lying to the south of it, was observed in the case of the garden soil. The highest temperature indicated by a thermometer placed in this soil at a distance of 6 inches from the wall, during a series of observations lasting seven days, (April 1852) was 32° Fahr. higher at the surface, and 18° higher at a depth of four inches than in the same soil on the north side of the wall. The average temperature of the former during this time was 8° higher than that of the latter.

In another trial in March, the difference in average temperature between the southern and northern exposures was nearly double this amount in favor of the former. Among the soils experimented on it was found that when the exposure was alike, the dark-gray granite sand became the warmest, and next to this the grayish-white quartz sand. The latter, notwithstanding its lighter color, often acquired a higher temperature when at a depth of four inches than the former, a fact to be ascribed to its better con-

VIII. *Cohesiveness of the soil.*—A soil is said to be heavy or light, not as it weighs more or less, but as it is easy or difficult to work. The *state of dryness* has great influence on this quality. Sand, lime and humus have very little cohesion when dry, but considerable when wet. Soils in which they predominate are usually easy to work. But clay has entirely different characters, and upon them almost exclusively depends the tenacity of a soil. Dry clay, when powdered, has hardly more consistence than sand, but when thoroughly moistened its particles adhere together to a soft and plastic, but tenacious mass; and in drying away, at a certain point, it becomes very hard, and requires a good deal of force to penetrate it. In this condition it offers great resistance to the instruments used in tillage, and when thrown up by the plough, it forms lumps which require repeated harrowings to break them down.—Since the cohesiveness of the soil depends so greatly upon the quantity of water contained in it, it follows that thorough draining, combined with deep tillage, whereby sooner or later the stiffest clays become readily permeable to water, must have the best effects in making such soils easy to work.

The English practice of burning clays speedily accomplishes the same purpose. When clay is burned and then crushed, the particles no longer adhere tenaciously together on moistening, and the mass does not acquire again the unctuous plasticity peculiar to unburned clay.

Mixing sand with clay, or incorporating vegetable matter with it, serves to separate the particles from each other, and thus remedies too great cohesiveness.

When water freezes, its volume increases, as is well known. The alternate freezing and thawing of the water which impregnates the soil during the colder part of the year plays thus an important part in overcoming its cohesion. The effect is mostly apparent in the spring, immediately after "the frost leaves the ground," but is usually not durable, the soil recovering its former consistence by the operations of tillage. Fall-ploughing of stiff soils has been recommended, in order to expose them to the disintegrating effects of frost.

IX. *Absolute weight of soils.*—According to Johnston, a cubic foot of dry silicious or calcareous sand weighs about

	110	lbs.
Half sand and half clay, .	96	"
Common arable land, -	80 to 90	"
Heavy clay, . . .	75	"
Garden mould, rich in vegetable matter, ...	70	"
Peat soil, . . .	30 to 50	"

This concludes our study of the physical characters of the soil, as they affect its fertility. It is seen that our knowledge is very incomplete, and the whole subject is in the highest degree worthy of an extended investigation. Such a research is an

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ducting power. The black soils never become so warm as the two just mentioned, demonstrating that color does not influence the absorption of heat so much as other qualities. After the black soils, the others came in the following order; Garden soil, yellow sandy clay, pipe clay, lime soils having crystaline grains, and lastly a pulverulent chalk soil.

To show what different degrees of warmth soils may acquire under the same circumstances, the following maximum temperatures may be adduced. At noon of a July day, when the temperature of the air was 90°, a thermometer placed at a depth of little more than one inch, gave these results:

In quartz sand, - - -	126°
In crystaline lime soil, - - - -	115°
In garden soil, - - -	114°
In yellow sandy clay, - - -	100°
In pipe clay, - - -	94°
In chalk soil, - . - -	87°

Here we observe a difference of nearly 40° in the temperature of the coarse quartz and the chalk soil. The experimenters do not mention the influence of water in affecting these results—they do not state the degree of dryness of these soils. It will be seen, however, that the warmest soils are those that retain least water, and doubtless something of the slowness with which the fine soils increase in warmth is connected with the fact that they retain much water, which in evaporating appropriates and renders latent a large quantity of heat.

Malaguti and Durocher also studied the effect of a sod on the temperature of the soil. They observed that it hindered the warming of the soil, and indeed to about the same extent as a layer of earth of three inches depth. Thus a thermometer four inches deep in green sward, acquires the same temperature as one seven inches deep in the same soil not grassed.

It is to be remembered that the soils that warm most quickly, also cool correspondingly fast, and thus are subjected to the most extensive and rapid changes of temperature. The green sward which warms slowly, retains its warmth most tenaciously, and the sands that become hottest at noon-day, are coldest at midnight.

enterprise not at all difficult to carry out, by a proper combination of knowledge, skill and pecuniary means. I am more and more convinced that no one thing would so greatly contribute to increase and maintain the productiveness of our fields, as a thorough knowledge and application of the principles that are stated or suggested in the previous pages. We should thereby secure the proper basis for the chemical melioration of the soil by means of manures, and as thus one most fruitful source of the failure of fertilizers would be removed, we should have reason to hope that the vexed question concerning them would be brought to a solution, and out of the present confusion of agricultural opinions and practices, would be evolved a system having in it some signs of harmony and completeness.

That between these different characters of the soil and circumstances in which it may be found an intimate connection exists, is perfectly obvious. In these pages the writer has endeavored to show this connection to a sufficient extent; much more, however, might be written regarding it—much space might also be occupied with the discussion of the characteristics of special soils, but it would be necessary in so doing, in the deficiency of experimental data, to trust more to speculation than is desirable in cases complicated with so many conditions. The subject is therefore commended to the careful study of the farmer, in full confidence that he will here and there be able to derive practical benefit from it. In conclusion it must not be neglected to repeat, that in addition to these physical characters, the *chemical properties* and *relations* of the soil (including the theory of manures), are concerned in determining the fertility of soils, and a comprehensive view of the whole subject is indispensable to the highest success in making a practical application of science.

For the full elucidation of the chemistry of the soil, and for the theory of those mechanical operations, as drainage and tillage, which, serving greatly to improve the physical condition of soils, also materially influence its chemical character, the reader is referred to Johnston's "Lectures on Agricultural Chemistry and Geology," or to Stoeckhardt's "Chemical Field Lectures."

Does Sunshine tend to Extinguish Fire?

The common opinion that the sun shining on a fire tends to extinguish it, and that consequently the embers must be shaded, if we would preserve them alive in a fire place, was made the subject of experiment in the year 1825 by Dr. Thomas McKeever, of England, and the results seemed to show a real foundation for the opinion that solar light does actually retard the process of combustion. These results were copied by the contemporary scientific journals, and even the great German chemist, Leopold Gemelin, in his *Handbook of Chemistry*, announces Dr. McKeever's conclusions, without expressing any misgivings in relation to their accuracy. Sunshine is an agent which is certainly capable of producing very remarkable effects; but the disagreement of this with other facts, has recently led Dr. John LeConte. Professor of Natural Philosophy in the South Carolina College, to repeat the experiments of McKeever, but using greater care; and the results obtained, as detailed by him at the late meeting at Montreal, tend to overthrow the idea, and prove that light has no influence whatever on the rate of combustion.

The fire employed in both the sets of experiments was simply a wax candle. McKeever found it to burn about 12 per cent faster in the dark; but LeConte finds the light of the sun, even when concentrated by a large lens produces no effect except by heating. If the air in the dark be heated to the same extent, and the air in each case be kept equally quiet, the candle burns at precisely the same rate. McKeever's experiments indicated that the candle burned from 5 to 11 per cent faster in the dark than in common sunshine. He supposed that the chemical rays exercised a deoxidizing power which, to some extent, interfered with the rapid oxydation of the combustible matter, and by trying the candle in different parts of the colored spectrum (produced by decomposing a ray of light in passing it through a prism,) his experiments appeared to indicate that a taper burned more rapidly in the red than in the violent extremity of the solar spectrum.

The whole subject cannot as yet be considered definitely settled, as the recent paper is regarded as merely preliminary

to a more thorough experimental investigation, which Dr. LeConte proposes to undertake during the next twelve months. It is obvious that these researches have a practical bearing.

Canadian Agriculturist.

Wheat Crop.

The New York *Courier and Enquirer* remarks, in relation to the wheat crop, that in the several States it may be considered as harvested, and partially ready for market. We can, therefore, give the following returns with some degree of certainty:—

	PER CENT.
NEW YORK.—The crop is under the last year's about fifteen per cent., but the quality is much better,	85
PENNSYLVANIA.—The crop is fully an average one, but ten per cent. less than last year per acre,	90
MARYLAND.—The crop is an average one, but less per acre, and better in quality than last year,	100
VIRGINIA.—The wheat crop in this State is twenty per cent. less than last year, for the amount of ground in cultivation, and the quality not much superior,	80
NORTH CAROLINA.—The crop in this State is probably nearer to a total failure than in any other—the yield being fully fifty per cent. less than last year, and poor in quality,	50
KENTUCKY.—The crop is above the average, but less than last year; the quality is, however, unsurpassed,	95
TENNESSEE.—The crop is a good one, but under the average yield per acre. The quality is good,	95
MISSOURI.—The amount of the wheat crop in this State is not fully known, but it will generally compare well per acre with the other Western States,	95
OHIO.—The yield of wheat per acre is fully twenty per cent. less than last year, but from the increase of land in cultivation, the decrease from an average crop will not much exceed ten per cent.,	80
IOWA.—The accounts from the center of the State, in regard to the wheat crop, are very gloomy. The crop will hardly average ten bushels to the acre. Oats are generally a failure,	50
ILLINOIS.—In Southern Illinois the yield of wheat is about a fair average, rather under than over. The winter wheat has been generally successful, and spring wheat the reverse. In other parts of the State the yield will not be over half the usual crop,	75
INDIANA.—In Indiana the yield of wheat has been from one-half to two-thirds of the average crop,	67
MINNESOTA.—The yield of wheat in this State is of better quality than usual, and in quantity nearly two-thirds the usual crop,	68
MICHIGAN.—The yield of wheat in Michigan is over two-thirds an average crop, and generally of good quality,	70
WISCONSIN.—The crop of wheat is up to the average, the greater extent in cutivation compensating for any deficiency in the yield per acre,	100
	15)1200(80

The upward tendency in wheat, promising good prices, and the present fair prices, will, we think, make the receipts at tide-water this year nearly equal to those of last year. The quality of last year's wheat is such that an attempt to store it longer will be ruinous. We have reason, therefore, for believing that the movement of the crop to the seaboard will be active for the rest of the year.

[The above is extracted from Hunt's Merchants' Magazine for October, with the exception of the column of figures on the right hand, which we add to represent the percentage of last year's crop produced this year. This is done with the view of determining the *average* deficiency, which we find to be 20 per cent., in the fifteen wheat-growing States above cited.—EDITOR.]

From the Valley Farmer.

Hog Killing.

BY HETTIE HAYFIELD.

The revolving seasons have brought to our homes the two last months of the year, including in their range of business beyond all comparison the most disagreeable duties that devolve on the house wife. But use conquers disgust, and that fact with proper preparation for, and systematic arrangement of the work while in progress, makes even *hog killing* an endurable business. Indeed in large families, we think several hog killings desirable and certainly economical, as many portions of the animal which are considered the perquisites of the pork house, come in an excellent place at home. It is a pleasure, beside your own well cured bacon, to have

a supply of sausages and lard that you can use without any disagreeable doubts of their cleanliness. Before hog killing you should have your meat house and store room in perfect order, and every implement and vessel requisite, ready for use. There should be on hand a sufficient supply of salt, saltpetre, ground cayenne pepper, sage, spices, &c. To have them to hunt up, clean and prepare, is a great backset to work, while perhaps you are out of doors and rain approaching. Being prepared in your department, I take it for granted that your paragon of a husband has had his pork bred and fed in the most approved style. That during the slaughter a hand has been detailed to look carefully over the heads and feet after the animal has passed off the platform, and after putting them in perfect order, has washed the outside carefully. That a second person, armed and equipped with an abundance of clean water and towels has followed the opener and washed out the inside until a search warrant could find no trace of the murder. In short, that you have no room to believe that the animal was humanely allowed to keep a part of his clothing and take a farewell wallow in his old haunts. These pains can surely be taken for home, and such pork we know commands a premium in the family market.—Hogs that weigh between two and three hundred pounds are the nicest for family use. Larger than that they are too gross, and do not allow fresh pieces for the table as often as is desirable consistent with good economy. Smaller there is too much bone and the meat becomes too dry.

CUTTING OUT PORK.

This work belongs to the male division of the house, and the master or well trained old servant will do it up without your ever thinking of it—probably. But lest you should not have had time to teach that old man, or your patriotic lord should have gone to the Presidential election, we will give a few brief hints on this branch of the business. Have the hog laid on his back. Clean the carcass of the leaf fat. Take off the feet at the ankle joints. Cut the head off close to the shoulders; separate the jowl from the skull, and open the upper part lengthways on the underside so as to remove the brains fully. Remove the backbone in its whole length and with a sharp knife cut off the skin, taking all but about a half inch of fat off the spinal column. The middling or side is now cut from between the quarters, leaving the shoulder square shaped, and the ham pointed, or which may be rounded to suit you. The ribs are next removed partially or entirely from the sides. The fat trimmings from the hams and flabby parts of the sides are rendered up with the backbone strip. The sausage meat is cut from between the leaf fat and the ribs; any other lean pieces are used for the same purpose. The thick part of the backbone being now cut from the tapering bony end you can now proceed to

SALTING.

When your meat is to be pickled it should be heavily sprinkled with salt and drain for 24 hours. When it is to be prepared with dry salt, mix one tea spoonful of pulverized saltpetre to one gallon of salt, and keep it warm beside yon. Cut off a hog's ear, and with it rub every piece of meat with the salt, on the skin side until it is moist, then lay it down and rub and cover the flesh part entirely with salt. Pack hams upon hams, and sides upon sides, &c., &c., for convenience in getting them to hang up at different times, as they will not all be ready at once. It is likewise best to put the large and small pieces in different divisions. The weather has so much to do with the time that meat requires to take salt, that no time can be safely specified. After three weeks fry a piece from the thickest part of a medium sized ham, if salt enough, all pieces small and of the same size are ready for smoking, and the larger ones can wait a few days. The jowl and chine are salted in the same way for smoking. The heads after soaking a day and draining well are salted less heavily and used fresh. The backbones and spare ribs are just sufficiently salted to keep—the last, if the weather is freezing may be kept quite fresh. The feet may be packed away in salt if not to be immediately used, and will prove almost as good, at any period of the year as when first killed—they are kept thus much better than in pickle, tho' ribs, (when the weather makes much salt necessary) keep sweeter in pickle. Many persons turn over and rub their pork once in a week while it is in salt. We have

never practiced it nor ever lost a joint.—And now having trespassed thus far on the gentleman's province we may as well say that when the pork is ready to hang, the raw side should be well sprinkled with cayenne. About the bones especially a good supply should be laid on. The hams should be hung highest, because there they are least liable to the attacks of insects.—A fire place on the outside, communicating with a smoke flue, is preferable for a meat house to any internal arrangement, because it does not heat the room, which, by the way, is the best if lofty, cool and dark. We give a receipt for pickle for pork, and the English method of curing bacon, and then retrace our steps clear back to the slaughter house, as possibly, you may have to direct some novice there.

PICKLE.

One gallon of water, one and a half pounds of salt, one-half pound of sugar, or a half pint of molasses, one-half oz. of salt petre, and (one half ounce of potash often omitted.) Boil and skim thoroughly, and pour over the meat perfectly cold. It must remain a month if for bacon; and if to keep pork all the year, should be boiled over two or three times in the warm months with an additional cup of salt and sugar.

ENGLISH BACON.

So soon as the meat comes from the butcher's hand, rub thoroughly and fill every crevice with fine salt. Next day scrape off the salt not absorbed, cleanse out the vessel, salt the pork as the day before, repeat this three days. The fourth day use pulverised salt-petre mixed with a handful of common salt, (1·4 lb. of salt-petre to 70 lbs. of meat.) Then mix 1 lb. of coarse brown sugar and 1 pint of common molasses, and pour over the salt-petre—repeat this four times a day for three days and afterwards twice a day for a month. Then smoke it with maple or hickory, or clean corn cobs.

And now to begin with the beginning of our own proper womanly labor. There should be ready an abundant supply of clean hot and cold water, tubs, buckets, cloths and so on. A long stout table for ridders to stand by and a tray in which to receive the entrails as they fall from the cavity of the animal's body. The opener should hang the livers, &c., on a pole to cool for purposes, hereafter mentioned. The ridders should proceed as quickly as possible to their business; it is easier done while the intestines are warm. The melts and sweet breads are cut off and thrown into some convenient vessel, then clear the maw of fat, next strip the intestines, being careful not to cut them and so soil the grease. The thin gauzy parts called the veils should be thrown together in one vessel of cold water. The capes into another and the strippings into a third. The maws and large intestines should be opened, emptied, washed clean and put to soak, to be afterwards used for chitterlings or soap grease. The small intestines are saved and cleansed for stuffing sausages. Close your day's labor by having your fat washed again and put in fresh water to soak; do the same office for your sausage skins and chitterlings.

Your first care after this is the lard. Render up the gut-fat first; having washed it clean, put it into your kettles, separated as the day before, because being of unequal bulk it will render up unequally, or else cut up the thick parts very small. You may use a brisk fire until the water is out nearly, when the cracknels are brown and crumble easily, or when the lard will sputter when water is dropped in, it is done. Strain it off into a kettle and when cool put it in what vessel you choose—(hot lard will melt tin or leak through the best wooden vessels.) Leaf lard should be so handled as not to require washing, as water increases the chances of its spoiling. It should be rendered up slower than gut fat, as it is easier scorched. Always put a ladle of melted lard in the bottom of your kettle instead of water. Cut up your leaf lard into thin pieces and render it to itself. The strip which comes off the back bone and other trimmings should be skinned and cut up small; they make good lard but render up slowly. The practice of putting ley in lard which begins to prevail, bleaches but impairs its quality. When you have finished your lard throw all your skins and the fat from around the kidneys, which is usually wormy, into a kettle, and render it up as dirty grease. Subject your cracknels to the strongest available pressure; a patent cider press answers well. Save your cracknels carefully. They shorten a favorite corn bread, make the best of soap

grease and are a remunerating treat to your poultry.

SAUSAGES.

Wash your sausage meat in tepid water, but do not soak it, see that it is free from bone, gristle, sinews, &c., &c. Cut it up in small pieces; to 3 lbs. of lean meat, allow 1 lb. of the leaf fat; chop or grind it very fine. Mix in this quantity 3 oz. of salt, 1-2 an ounce of pepper and two table spoons of powdered sage. When well mixed, cook one and try it; it is easy to add seasoning, therefore be cautious in using it. Your sausage will become more salt as it dries. Add any spice you like.

Bologna Sausage, is made by using one-third of beef, seasoning more strongly, and *boiling after stuffing, before drying*.

FEET.

Under another head, we have said that we consider it best, to salt down the feet instead of pickling. Previous to salting they should be carefully examined, the hoofs taken off, not a hair left; be scalded, scraped and soaked until perfectly white. If wanted for immediate use they will be ready for boiling after laying a night in salt water. Many persons boil the feet and ears and keep them in cold spiced vinegar, ready to use cold or to fry; this is termed souse. Others boil the heads and feet until they can be freed from bones, and mash to a pulp; this is seasoned with salt, pepper and spices, moulded and kept in vinegar and termed pork cheese.

SAUSAGE SKINS

Are prepared by repeated soakings and washings. Then being turned they are scraped free from the slimy coating, until when blown up they are perfectly transparent. They are again soaked in salt water, several days, changing it every day, and are then filled with sausage meat by some of the various implements devised for that purpose.

BLACK PUDDINGS

Are made by stirring corn meal into the fresh blood of hogs. It is seasoned with salt, pepper and spices; stuffed and used as sausages.

Chitterlings, are made by cleaning the maw and large intesines of the hog. Quick lime will soon enable you to rid them of all the slimy coat. Having soaked and washed them until white and inodorous you may keep and use them as you would beef tripe. The livers, kidneys, &c, &c., may be all boiled well with sufficient salt to keep, and a strong seasoning of pepper and kept for your fowls all winter. The livers, however, melts, suet, heads, &c., are esteemed table luxuries, and are kept by sprinkling slightly with salt.

The maws and larger intestines, with any other fat parts, should be thrown into a kettle of weak ley, and boiled until the grease from them rises to the surface. This grease is useful for soap, wool or farm implements.

Lastly, the hair of the hog should be saved for mortar, or with proper preparation makes a good mattrass, or with the bones may be sent to the compost heap.

For the Southern Planter.

Lard Cured With Soda.

To every gallon of lard, before it is washed, put one ounce of Sal Soda, dissolved in one gill of water; the fat needs no other washing or soaking than that just before being put on to cook, don't fill your pots as full as when cured without soda, as it makes it foam and it will boil over. When the lard is done, it will be as clear as spring water, all the cracknels eaten up, only a small crust on top, which will sink gradually after it is taken off the fire. You get more lard in this way. It also keeps for two years *perfectly sweet*, is *firm* during the whole summer, and is most beautifully *white when cold.*

Great caution should be observed as to *stirring when nearly done*, too much being apt to make the "*pot boil over.*"

Mrs. V. has cured her lard by this recipe for three years, and is indebted to Mrs. Julien Harrison, of Goochland, for it, she having procured it from Mrs. Peyton Harrison of Cumberland.

From the Country Gentleman.

Winter Feed for Milch Cows.

MESSRS. EDITORS—I wrote to you some time ago for information in relation to Savage's Steam-boiler, and mentioned to you that I was sending milk to New-York by the Harlem railroad, and wanted to find the best way to heat water in sufficient quantities to scald feed for about thirty cows daily, through the winter.

In your reply you requested me to write for publication in your papers, my mode of preparing cow feed in winter, and how I feed my cows in summer; and now, after some delay, I will endeavor to comply with your request.

In summer, I turn them to pasture, having a plenty of rough land that is good for little else.

In winter, their feed consists of corn, oats and hay. I bring in a portion of my corn in the stout, without husking, when sufficiently dry, and mow it away for winter use. I then cut the corn, together with oats in the sheaf, and tread the mixture down in a large feed tub, or a hogshead with one head, and turn on fifty or sixty gallons of boiling water, which softens the corn so that the cows can eat it without making their teeth sore, and the oats will be perfectly cooked through, so that they will all digest.

I have one of Daniel's patent feed cutters, which I purchased about three years ago at R. L. Allen's agricultural warehouse and seed store, at 189 and 191 Water st., New York—cost, twenty-five dollars. It is calculated to go by horse power, but is the best hand power cutter I have ever seen, and when in good order, two men will cut feed enough in one hour for my thirty cows one day, or two feedings.

One hogshead full of feed, well trod down, will make about thirty pailfuls, or one feeding for my cows. I feed them twice a day with this feed, and they have what hay they want besides.

The advantage that I find in preparing my feed in this way, over that of threshing and grinding, is—1st. It is cheaper to cut my oats and corn than to thresh and husk the same—2d. I save the trouble of carrying my corn and oats two miles to mill, and bringing it home again—3d. I save the toll which is something of an item—4th. The whole of the oats, straw, chaff, &c., and the whole of the corn, stalks, husks, cobs, silk and all, is eaten, except some of the largest butt ends of the stalks are left, which I consider no loss, as they are not fit for any animals to eat—5th. I get more milk than I can make out of dry feed; and although I have tried no definite experiments, I am satisfied that the same quantity of corn and oats prepared in this way will go about as far again as to thresh and grind them, and throw away the straw and chaff, which, fed dry, (in case a cow can be coaxed to eat it,) will only have the effect to dry up her milk.

My cows eat their feed greedily, and with two heaping pailfuls a day to each cow, it requires less hay to fill them up, and as each cow gets three or four gallons of water in her scalded feed, night and morning, while standing in her stall, she will not crave so large a quantity of cold water when let out in the morning, as she would if fed on dry provender and hay; and the chilling effects of cold water taken in large quantities, cannot be very favorable to the making of milk.

Corn, to be fed in this way, should be planted not over three feet apart each way, so that the stalks will not be very coarse and the more leafy, and although the ears will not be very large, yet they will probably yield as much weight by the acre as when planted three and a half or four feet apart, and particular care should be taken to have it secured and brought in in good order.

The objection to this mode of preparing food, is the trouble and expense of heating water, which I think might be greatly obviated by bringing into use some of the newly improved boilers that are advertised for heating houses, &c., with very little time and fuel, and have them so constructed as to adapt them to our use.

I believe this to be the true way to feed oats to milking cows, but corn prepared in this way does not perfectly digest, and ought to be put into a large boiler, and by standing a few hours over the same fire that it requires simply to boil the water, the kernels will crack open and become perfectly digestible. I have practiced the latter course for two winters past with good success, by using a wooden box with a sheet iron bottom, but it takes rather too much wood, and the box gets dried up and out of order every summer.

The object of my former inquiry was to find some kind of a boiler to meet my particular wants, and any information in relation to the subject through the columns of The Cultivator, will be thankfully received by a subscriber. H. H.

Wassaic, Dutchess Co., N. Y.

Apples which hang on the trees should be knocked off, as they are fruitful sources of rust and other cryptogamic diseases.

From the Veterinary Journal.

Interesting Article on Mules.

Mr. Editor—

Supposing that little is known among the generality of your readers as to the extent of the mule business in this State, I concluded it would not be uninteresting to them to learn concerning it, and something of the character of the beast itself, as I take it for granted they have not had an opportunity of learning all his phrenological developments or temperament.

The mule trade is one of the largest of Kentucky, and affords one of her chief sources of revenue. The increasing demand for them in the South, among the sugar and cotton planters (which is owing no doubt to the great number of farms annually being opened,) affords a very easy solution for the eagerness and extent to which stock growers launch into the trade, for it is a very heavy business, requiring a great deal of capital. The mule is fed from weaning time (which is generally at the age of five or six months,) to the full extent of its capacity to eat, and that too on oats and corn, together with hay and fodder. In lieu of the long food, soiling is usually adopted in the summer, as they are kept confined in a pound or paddock, containing an acre or two of ground, which is usually partially shaded, in herds of one hundred and fifty. In this way they are kept until the fall after they are two years old, receiving a sort of forcing, hot house treatment. At this age they are taken to the southern market, not always by the feeder, but more generally by the speculator or "trader," there they are sold to the planter entirely unbroken. The planters are too cautious to buy a broke mule, lest it should prove to be an antiquated, broken down beast, fattened up, and sold for a young one,—as it is more difficult to judge of their ages than that of a horse. The external marks of time, and service is not generally so apparent upon them.—But it is a small job to break a mule. It is only necessary to have a steady horse to work them with and a second hand to drive them an hour or two to keep him up, after which, he is considered ready for any service that the farmer may require of him. He may kick once or twice, but is unlike the spirited horse, who when he commences is apt to kick himself out of the harness before he stops.

There were in this county, in the year 1855, 2,000 mules; in 1856, there were 2,888; the number in the county at present I have no means of ascertaining, but suppose it is at least as great, perhaps greater than in any previous year. The probabilities are that all of these, or as many, were fed in this county each year. The counties immediately around no doubt fed equally as many, some no doubt more. The counties of Bourbon, Fayette, Clark and Jessamine are engaged quite as extensively in the trade as this.

Besides the great number of mules fed annually in these counties, we supply New Orleans, New York, and other cities with an immense amount of beef, mutton and bacon. These facts being considered, you may readily imagine that we must, of necessity, be a grain growing people. Such is the fact. Yet so extensive is the mule business, and so great are profits upon feeding, that those engaged in the trade can afford to give 40 cts. per bushel for corn, at least they say so, and cannot get it for less.

In this portion of Kentucky, a lot of mules is almost considered a legal tender; no man is afraid to buy mules at a little less than he thinks they are worth if he has anything to feed them on, for he knows that some buyer will come along in a few days and pay him a small profit on the first cost and the grain they have eaten.—It is not unusual for a farmer to borrow money out of banks on four or six months' time, to pay for a lot of mules to eat up his surplus of provender, knowing that it is more profitable to do so than to sell the surplus at home.

As a consequence of this great mania, if it might be so called, and which has now existed for several years, good horses have become comparatively scarce, saddle and harness horses commanding the most exorbitant prices, the sports of the turf were in a perfectly collapsed state, the best stallions were poorly patronized, and mares of finest form, the purest strain and most brilliant escutcheon, were basely "prostituted to the forced and ignoble embraces of the assinine ravisher."

The average price of weanlings is about $75. No. 1 from $80 to $90, and extra, often as high as $120. A lot will often

change hands as often as a dozen times before they are ready for market. Yearlings will average, I suppose, about $100, owing in a great extent, however, to their quality. At two years' old they will bring $125 or $130, if they are average select lots, more. A neighbor of mine is feeding a lot of one hundred, for which I am told he has refused $175 around. But this is an extra lot, no doubt the best lot in Kentucky. The same gentleman gave a short time ago $300 for a two year old to work to his sulky, and is working to his farm four, for which I am told he paid $200 each. Another gentleman of this county sold a short time ago, a two year old mare mule for $400. But these are fancy prices for fancy mules. There is a small and inferior class of animals that is considered a sort of dead heads, and which the feeder won't buy if offered alone, and these are ones usually found in service on the farms.

Until forced by the scarcity and high price of horses, the Kentuckians would not use mules. But within the last few years they have become common on the farm, pulling the plough and wagon, and occasionally a clever pair is seen in the carriage, some of them are pretty glib goers for an hour or two, when they get lazy and they will then take the lash "*like a mule.*"

Persons who have tried them on their farms are better pleased with them they say, than they thought they would be.—They never get sick, rarely ever get lame, will do as much work as a horse which will cost twice as much money, and at the same time subsist on less and more inferior food, for a mule will work very well on wheat straw and corn shucks, whereas the horse must have grain as well as a good allowance of long food. They are better for our servants to handle, as they can stand neglect and violent treatment better than the horse, and a blemish, such as the loss of an eye does not impair his value as much as that of the horse.

As to their temperament and peculiarities it is useless to say much, the world knows pretty much what that is. He is not so apt to run as the horse but more apt to kick. He is fond of company, is decidedly gregarious, and his attachments are quite as strong when once formed as those of the horse. It is almost impossible to confine one away from an associate. He will climb over the fence if practicable like a dog, or if more practicable creep through a crack, or worm himself under it like a pig. An acquaintance of mine told me that he was once in the habit of working a pair together, but on one occasion wishing to use but one, he confined the other in a close stable, where as he thought, he would be compelled to remain. But on his return, he found to his astonishment, that the perverse beast had ascended into the hay loft, which enterprising feat it had accomplished by first getting into the trough, thence through the hole left for throwing the hay into the manger. The circumstance forcibly reminded him of the fact that the

> "Best laid schemes of mice and men
> Aft gang aglee."

And at the same time convinced him that if perseverance will not overcome all things, it will at least surmount a great many seemingly unsurmountable obstacles.

B. MUNROE,
Woodford County, Ky.

A Farmer's Library.

Dr. Johnson being once asked whom he deemed the most miserable, replied, "The man who cannot entertain himself with a book on a rainy day." Were the question put, What farmers are likely to make the most rapid progress and improvement in husbandry? the answer would be, other things being equal, those who read most on the subject of their vocation. A man who reads little, no matter what his vocation is, will be likely to think little, and act chiefly with reference to tradition received from former generations, or else in imitation of what is going on about him. There is always hope of a man who loves reading, study and reflection. Not all who buy books liberally, and patronize the press generously, are readers. There is a class of fancy book buyers, who purchase freely and expensively, but who read little and profit nothing from the stores of knowledge treasured up in their libraries. Fine collections of books nicely arranged on shelves may beget desires of covetousness, but can impart little or nothing, only as they are read, studied, and referred to.

Every farmer, whether rich or poor, learned or unlearned, should have a collection of books on agriculture, horticulture, and the several subjects more or less intimately connected with the objects of his special pursuit. A few good books, costing but little, should beginning of the farmer's library.

THE SOUTHERN PLANTER.

RICHMOND, VIRGINIA.

MR. FITZHUGH CATLETT is our authorized agent (at Guiney's Depot, Caroline County,) to receive money for us, and to give receipts. New subscribers are requested to leave their names with him, *daily, if not oftener.*

MR. GEO. C. REID is our Agent in Norfolk, Virginia.

F. N. WATKINS, Esq'r., at the office of the Farmers Bank of Va., at Farmville, is our authorized Agent to receive money due for subscriptions to this paper and to grant receipts therefor. Our subscribers in Prince Edward and the counties adjacent will please call on him.

Major PHILIP WILLIAMS is our authorized agent to receive subscriptions, and give receipts for us. See his card in our advertising sheet. Our subscribers in Washington City, and Georgetown, D. C., will confer a favor on us by settling their bills with him.

AUGUST & WILLIAMS.

Keeping Sweet Potatoes.

We are indebted to our friend, Col. J. Lucius Davis of Henrico county, for the details of a discovery of his in regard to the proper treatment of sweet potatoes in store, which will afford a new idea to our potatoe raisers, as well as give them a piece of information which we believe will be worth to them more than five years' subscription to the Planter (which is only $2 a year), and we trust they will all profit by it. One of our subscribers told us he made last year a very fine crop, but lost a large portion of it by the rot occurring after they were stored away.

They are worth taking care of from the fact that they sell well, and are among the very best of all the vegetables for table use. They are equal to almost the same quantity of bread —they make a first rate pie, and eaten hot with a plenty of butter and good rich milk, they are good and acceptable to almost every body any hour in the twenty-four.

Col. Davis says the rot is produced by *pressure*, and begins in the bottom centre of the pile, gradually fresh potatoes come into immediate contact with the rotten ones until it spreads through the pile just as a little leaven leavens the whole lump.

The remedy is to take off the pressure--so instead of making them into piles, they are packed away on shelves which are eighteen inches apart. These shelves may be nailed up to a common piece of studding 3x4 inches thick.—This studding should be boarded inside and out with common plank, and filled in between with pulverized charcoal, tan-bark, dry sand, or any warm, dry substance.

Potatoes thus stored away on shelves made in this manner, in a dry warm cellar, will keep until they dry up into mummies.

When potatoes are dug, they should not be "piled up" before they are dry, or otherwise upon being cooked, they will taste as if badly frosted, even before any frost has fallen to affect them.

NEW BOOKS.

Maury's Wind and Current Charts.

Our thanks are most respectfully tendered to Lieut. Maury, superintendent of the United States Observatory, &c., for the first volume, eighth edition, of his great work, entitled Explanations and Sailing Directions, to accompany the Wind and Current Charts, approved by Capt. D. N. Ingraham, Chief of the Bureau of Ordnance and Hydrography, and published by authority of Hon. Isaac Toucy, Secretary of the Navy, Washington, 1858.

It would be the height of presumption were we to attempt, with our short line, to take the soundings, or to fathom the depths of this learned work on meteorological science—the fruit of unnumbered facts and observations, collected with immense labor, and generalized with such accurate—we had almost said matchless discrimination, as most clearly to develop the great natural laws which "the wind and the sea obey," and by the promulgation of which millions have already been saved and added to the wealth of nations through the increased expedition and safety imparted to the movements of commerce.

We can but render to genius the profound homage of our admiration for the ability displayed in the production of this work, while, as

comparative babes in knowledge, we draw the pure milk of instruction from its pages and gratefully acknowledge our indebtedness to its distinguished author for introducing us into "new fields" of thought and reflection—of intellectual enjoyment and moral improvement, to be derived from the contemplation of the "unsearchable" "depth, both of the wisdom and knowledge of God"—the Supreme Mechanist, as displayed in the wonderful adjustment of the grand machinery of nature,—the nice adaptation of all its parts, mutually to subserve each other in the perfect order, harmony and beauty of their operation, in accordance with the general laws which govern their relations.

PHELP'S BEE-KEEPERS CHART: *A Practical Treatise on the instincts, habits and management of the Honey-Bee, &c.* New York: A. O. Moore, Publisher. p. p. 96, 1858.

This little manual, by E. W. Phelps the inventor and patentee of the Ohio Combination Bee-Hive, is designed as an accompanyment of it, to give practical and full instruction on the treatment of Bees. One of these hives is in full operation in the window of the Agricultural Office adjoining ours, and affords an agreeable subject of examination to numerous visitors. The proprietors of this paper are agents for the sale of the hives.

NEW ENGLAND CHATTELS: *Or, Life in the Northern Poorhouse.* New York: H. Dayton, Publisher.

The above is the title of a fictitious narrative which, leaning to one extreme, may very well serve as a foil to Uncle Thom's Cabin, which represents the other. It is designed to expose an evil said to exist in some of the towns or parishes of New England in relation to the manner of providing by contract for the support of that class of indigent persons who, by reason of old age or other infirmity, are unable to earn a livelihood, and are therefore dependent on public beneficence for their maintenance. The revolting idea of seeking to diminish the public charge, by contracting within the narrowest limits the comforts and privileges of this unfortunate class of fellow-beings whose forlorn condition pathetically appeals to public kindness and pity is represented as (in effect) an approved principle of public policy in some of the New England townships. The competition of cupidity is enlisted by inviting proposals, or by instituting an auction-scramble for the privilege of maintaining the town paupers. They are publicly cried out in either event to the lowest bidder, and surrendered as chattels to the tender mercy of the successful competitor, who seeks remuneration for his outlay in the largest amount of labor, which can be wrung out of them by such expedients of cruelty and oppression as the greed of avarice may suggest, while grudgingly allowing them the scant provision for their physical wants which falls within the limits of the small aggregate of money for which he has bound himself to support them.

"Go gladly, with true sympathy,
Where want's pale victims pine,
And bid life's sweetest smiles again
Along their pathway shine.
Oh, heavily doth poverty
Man's noble instincts bind;
Yet sever not that chain, to cast
A sadder on the mind."

The North Carolina Planter.

The Editor of this paper, in an address to the Agriculturists of the State of North Carolina—which we copy below—distinctly informs his patrons that if they desire the continuance of his paper, "the number of subscribers must be greatly increased." Will the intelligent and patriotic Farmers and Planters of the Old North State suffer this excellent paper to languish or die, for the want of adequate support? Do they not owe it to themselves to sustain a home organ, (and where will they find a better,) for the advocacy of their interests, and for the dissemination of knowledge on those branches of husbandry in which, if they are not in advance of the age, they must all feel a conscious need? Who among them possessed of a particle of State pride, or entertaining a kind sentiment towards his neighbour, that would prompt him to a trifling sacrifice to promote his good, can refuse the mere pittance demanded of him for such purpose? Especially, when it is remembered, that, the benefit conferred, will react in blessings upon himself in "good measure, pressed down, and running over," while he will instrumentally contribute to the common weal in helping to erect a fountain of knowledge, which will send forth its healing streams to enrich and bless the State!

For very shame, gentlemen, double the sub-

scription list of your Planter, *and for the love of well-doing increase it* FIVE-FOLD !! You will feel all the better for it!

We heard of a wealthy gentleman who was bewailing to a friend, the determination of a very talented son-in-law, (of whom he was justly proud,) to remove to a distant part of the country for the purpose of bettering his pecuniary fortune. "He is right to go away," answered his friend. "He has been waiting on you for years, and you have done nothing towards meeting his just expectations. He is of course right, in determining to leave you. But, if you wish to intercept his purpose, provide for him according to your ability and his merits, and my life upon it he will not leave you." It was done. The removal was arrested. In a short time afterwards, the father-in-law acknowledged to his friend that he had found the greatest satisfaction in following his advice. "Would you double your satisfaction?" rejoined his friend. "Then just double your benefaction!" But to the address.

"TO THE PLANTERS OF NORTH CAROLINA.

"At the instance of numerous Agriculturists of the State, the undersigned was induced to commence the publication of the NORTH CAROLINA PLANTER, a copy of which you have before you. On the 1st of January last, the first number was issued, and it has continued to make its appearance regularly, the first of each month, since that time.

"Both the other Agricultural Periodicals—'The Arator,' and the 'Carolina Cultivator'—had been discontinued; and it was deemed highly important to the great Agricultural interests of the State, that a *home organ* should exist in North Carolina. Notwithstanding the failure of every other enterprise of the kind, we determined to try the experiment, and see if North Carolina Planters would support *one* journal, devoted especially and exclusively to their interests.

"We secured the services of highly competent gentlemen to take charge of the Horticultural, Pomological and Botanical department of the *Planter*,—and have been fortnnate in securing contributions from several intelligent, practical Farmers in furnishing editorial and communicated articles upon the general subject of Agriculture; and have enlisted the aid of our able and scientific State Geologist, Prof. E. Emmons, in advancing the enterprise by valuable contributions from his pen. We have published a much neater and more tastily gotten up Periodical than any of its predecessors; and yet after all these efforts to get up a first-class *North Carolina* Agricultural periodical, at the low price of *one dollar* per annum, we find, at near ly the close of the year, *less* than a thousand subscribers' names on our books.

"We lay these facts before those interested in the continuance of our publication, and will simply add, if they desire its continuance, the number of subscribers must be greatly increased. We ought to have five thousand subscribers; but if we can get two thousand to begin the next year with, it will be at least a guaranty that it will be sustained, and will justify us in making the improvements we desire for the ensuing year.

"It remains now to be seen whether the Farmers and others in the State, interested in its continuance, will give us their aid in increasing its circulation. The times for holding our State and County Fairs is near at hand. It will be inpossible for us to attend all of them, but if a few friends, at each of them, will exert themselves a little, our list can be increased hundreds, and perhaps thousands. Some will help us, we trust, freely, from a sincere desire to promote the Agricultural interests of the State in which they live, and in which they are so interestedly identified; and we are willing to allow a liberal per centage to others who will energetically press the claims of the Planter. We have no doubt an industrious man can make several dollars per day at these Fairs, by soliciting subscribers for the N. C. Planter. We offer twenty per cent. on all subscription money sent us, and hope to have several Agents operating for us, at each and all the Fairs in the State.

"A. M. GORMAN."

Milch Cows and Dairy Farming.

The reader's attention is invited to the advertisement of a new work on the above subject, by C. L. Flint, Secretary of the Massachusetts Board of Agriculture, and published by J. B. Lippincott & Co., Philadelphia, and A. O. Moore, New York. 1858.

The book is a 12 mo of 416 pp., fully and liberally illustrated, and comprises the breeds of stock, and especially the dairy breeds, the principles of breeding, the selection of milch cows, with a full and complete explanation of Guenon's Method, the feeding and management of dairy stock, the raising of calves, the culture of grass and forage plants, a treatise on the dairy husbandry of Holland, (where this branch is made a specialty and is carried to great perfection,) Horsfall's dairy management in England, &c., &c.

Our Own Paper.

We have witnessed with deep sensibility the kindness of our brethren of the press in their too flattering notices of *the Southern Planter* since our accession to the Editorial chair.

Emory's Journal of Agriculture and the Prairie Farmer.

The above Journals, hitherto maintaining a separate existence, have been united by the transfer of the entire interest of the Messrs. Medill in the last named paper with its good will, to Messrs. Emory & Co.

"By the union of the Journal and Farmer," say the Editors, "we shall have a wider range of experience and experiments to assist us. We ask for the continuance of that confidence and support that has so long been given to the *Old Prairie Farmer.*"

We hope the appeal of the Editors will not be disregarded, and that all concerned may find reciprocal advantage in the change. The character of the paper, judging from its antecedents, will doubtless be such as to entitle it to a generous support.

We have received the Catalogue of the Agricultural Library in the office of the Secretary of the Massachusetts Board of Agriculture; an octavo pamphlet of 29 pp. Boston. 1858. Containing a valuable variety of standard, useful and instructive works on Agricultural and Cognate Sciences, and on Stock Raising, Practical Husbandry, &c. We desire to express our grateful sense of the kindness of C. L. Flint, Esq., the Secretary, in sending it to us, and to commend to the notice of the State and district Societies of Virginia the importance of taking measures for the gradual accumulation of similar works.

The Proprietor, Franklin Davis, Esq., has furnished us with the "Descriptive Catalogue of Fruit and Ornamental Trees, Evergreens, Flowering Shrubs, Vines, &c., cultivated and for sale at the Staunton Nurseries, Staunton, Virginia. 1858." *See his advertisement.*

Henry R. Robey, Proprietor, has also furnished us with the "Catalogue of Fruits, ornamental Trees, Evergreens, Flowering Shrubs, Plants, Roses, &c., &c, cultivated and for sale at the Hopewell Nurseries, near Fredericksburg, Virginia." *See his advertisement in our advertising columns.*

We have received a list of the premiums of the Seaboard Agricultural Society. The exhibition comes off on the 9th, 10th, 11th and 12th of November next. We are indebted to the courtesy of the Secretary, for an invitation to the Fair, of which we hope to be able to avail ourselves.

Agricultural Agency.

We publish a letter from Samuel Sands. Esq., (the retired veteran of the *American Farmer*) in our present number. Mr. Sands will purchase for the farmers *anything* they may want in Baltimore, machinery, guano of every sort, and improved stock of every description. We wish him much success.

To Postmasters and Others.

We are satisfied, that with proper exertion, any person who will interest himself for us, will be able to make up a list of *new* subscribers for the "Planter," in almost any neighborhood, in this or any other of the Southern States. We offer, as an inducement to those who are disposed to aid and encourage us in our efforts to extend the circulation of this paper, the following premiums in addition to our hitherto published terms:

To any person who will send us clubs of
3 *new* subscribers and $6,—
The So. Planter for 1857.
6 *new* subscribers and $12,—
The So. Planter for 1857 and '58.
9 *new* subscribers and $18,—
The So. Planter for 1857, '58 and '59,
15 *new* subscribers and $30,—
The So. Planter for 1857, '58 and '59, and a copy of the Southern Literary Messenger for one year.

To single new subscribers we will send *the present* volume, (commencing with the number for January, 1858,) at the low price of $1 50, *paid in advance.*

We call upon every one interested in promoting the progress and improvement of agriculture, to lend us his aid in contributions of original articles on practical or scientific agriculture, in order that our paper may continue to be worthy of the confidence and support of those who have hitherto so liberally sustained it, and to whose interests its pages will continue to be zealously devoted.

AUGUST & WILLIAMS.

We invite the attention of our readers to the interesting essay on the Physical Properties of Soils, &c., by Prof. Johnson of Yale College.

To Subscribers.

In consequence of the change in the Proprietorship of the "Southern Planter," it is very important that our subscribers should remit the amount of their indebtedness with as little delay as possible.

The amount due from each subscriber is in itself comparatively trifling, but in the aggregate it makes up a very large sum, and if each subscriber will consider this as a direct appeal to *himself*, and promptly remit the amount of his bill, it will be of infinite service to us.

We commence sending with this number the bill to each subscriber who is in arrear, and shall continue to do so until all shall have been sent out. We ask, as a favor, a prompt response from all.

The bills are made up to 1st January next. The fractional part of a dollar can be remitted in postage stamps, or the change returned in the same.

AUGUST & WILLIAMS.

To the Editor of the Southern Planter:

DEAR SIR:—You can safely recommend to your "lady friend," who asks you for "a remedy for the *roaches*," the "Vermin and Insect Exterminator," of which I send herewith the printed label of the proprietors.

It has been used in my family several years, and we have found it very effectual in destroying roaches and mice, and in driving off rats, (many of whom it probably kills.)

It can be readily procured in Portland, Maine, by any of your druggists, who will, I think, find a ready sale for a faithful exterminator of vermin and insects.

Yours most respectfully,
ED. T. TAYLOE.

Powhatan Hill, Sept. 20th, 1858.

[The above specific is entitled Parsons & Co.'s "Vermin and Insect Exterminator." It is warranted to destroy rats, mice, cockroaches, ants and other insects.

The label directs the manner of using it, and is signed Chas. Parsons & Co.

It can be obtained through any of the principal druggists of Richmond. EDITOR.]

Farmer's and Planter's Agency.

BALTIMORE, Sept. 20th, 1858.

It may be interesting to many of your readers to learn that, in a day or two, the Peruvian agents in this city will resume the sale of their guano, which a month or more ago they suspended. They had a stock on hand at New York, which, it is supposed, they wished to close up, and accordingly gave notice to dealers that, when their stocks were sold, they would be obliged to obtain their future supplies for the season at New York. But the demand has been very limited this season—the high price of the article, and the inability of the farmers to buy in consequence of the shortness of their crops, has caused a very small amount to be sold this fall, thus far, to what has been disposed of heretofore at this season of the year—and most of those who are using it, are buying the phosphatic guanoes to mix with it—which, no doubt, is the best plan to use it. The price, from this date, will be $1 per ton less than it has been selling at for the past month, as the dealers had, generally, put it up to that amount, expecting when their supplies were out, to send to New York for more I quote it at $56 per ton of 2000 pounds in small lots—best A. A. Mexican Guano $25 per ton of 2240 pounds. Navassa or Brown Colombian $28 per ton of 2240 pounds. Elide or California do $40 per ton 2000 pounds. Manipulated, Reese's or Kettlewell's, $47 per 2000 pounds. All accounts concur in regard to the shortness of the crop of wheat in the United States. In Maryland it will not be more than a third of a crop, and, so far as I have heard from your State, it will not, I think, be any better with those sections which have their principal trade with our city. White wheat was selling to-day at 'Change at $1 25@$1 35 cts. for fair to good, $1 40@$1 48 for prime, and $1 50@$1 55 for choice family flour parcels; Red $1 25@$1 28 cts. for fair to good, and is in demand. Corn is also in request, sales to-day at 78@80 cts. for good to prime parcels of white, and 90@91 cts. for yellow. Maryland oats 38 @44 cts., Pennsylvania, 45@46. Rye, West Virginia 82, Maryland 70@72 cts., and Pennsylvania 85@87 cts. Flour, Howard St. and Ohio, $5 50, and City Mills $5 37 per barrel. Rye Flour $4 25@4 50, and Corn Meal at $4 25@$4 37.

Respectfully yours,
SAM'L SANDS.

For the Southern Planter.

On Centre Draught.

Dear Planter:

Can you not aid me in awakening in the minds of the community generally, and of the farmers in particular, an interest in the proper mode of gearing horses and mules to the different vehicles and implements to which they are daily worked? Would the community think me a madman if I were to assert, that at least one-fourth of the power of the teams used, independent of the injury done them, is lost by being improperly geared? There is a certain line of traction—the center-draught line, upon which, if the animal is so geared as that he can exert his power accurately upon it, he cannot only carry a much greater burthen, but carry it with much greater ease to him-

self, while he will be protected from the gauls so common among work-horses and mules. My object, at present, is not to discuss particularly that center draft-line, and how to obtain it, but simply to call attention to the *fact itself.* I wish also to call attention to the erroneous mode of hitching horses and mules to the *shafts* of *carts* instead of to a swingletree, as is done to buggies, wagons, &c. I have but a moment to write, and therefore will waive the discussion and explanation of the mode, or advantages hinted at. Indeed, if I had ample time, I think it would be better first, to excite, if possible, a curious interest in the subject, and then gratify it. For the present I leave the subject in your hands, and will wait to see if the farmers do really feel an interest in the matter referred to.

Yours truly,
OBSERVER.

REMARKS.—We hope our friend W. will continue his observations on all agricultural matters and give our readers the benefit of his experience and teaching. *We know* him to be a keen and careful "observer," and a *thoroughly practical man* in every respect. It is from just such men that we expect to derive benefit in farming, and we have no doubt our readers will be glad to hear from "Observer" frequently.

For the Planter.

"Bots" or "Grubs" in Horses.

DEAR PLANTER:

I hand you a recipe for *entirely destroying* "Grubs" or "Bots" in horses. It is furnished me by a friend who is very skilful in veterinary matters.

Take of	Indigo,	half oz.
"	Molasses,	" pint.
"	Water,	one quart.

Mix these well together in a bottle, and drench the horse with it. I am assured that after taking this drench, the horse will begin, in ten or twelve hours, to pass the worms from the bowels, and that it will certainly "knock them *blue.*"

Origin of Brandy.

Brandy began to be distilled in France about the year 1313, but it was prepared only as a medicine, and was considered as possessing such marvelous strengthing and sanitary powers, that the physicians named it "the water of life," (*l' eau de vie,*) a name it still retains, though now rendered, by excessive potations, one of life's most powerful destroyers.

Raymond Lully, a disciple of Arnald Villa Nova, considered this admirable essence of wine to be an emination from the Divinity, and that it was intended to reanimate and prolong the life of man. He even thought that this discovery indicated that the time had arrived for the consummation of all things—the end of the world. Before the means of determining the true quantity of alcohol in spirits were known, the dealers were in the habit of employing a very rude method of forming a notion of the strength. A given quantity of the spirits was poured upon a quantity of gunpowder in a dish and set on fire. If at the end of the combustion the gunpowder continued dry enough it exploded, but if it had been wetted by the water in the spirits, the flame of the alcohol went out without setting the powder on fire. This was called the proof. Spirits which kindled gunpowder were said to be above proof.

From the origin of the term "proof," it is obvious that its meaning must at first have been very indefinite. It could serve only to point out those spirits which are too weak to kindle gunpowder, but could not give any information respecting the relative strength of those spirits which were above proof. Even the strength of proof was not fixed, because it was influenced by the quantity of spirits employed—a small quantity of weaker spirits might be made to kindle gunpowder, while a greater quantity of stronger might fail.

Clark, in his hydrometer, which was invented about 1830, fixed the strength of proof spirits on the stem at the specific gravity of 0920 at the temperature of 60 degrees. This is the strength at which proof spirit is fixed in Great Britain by act of Parliament, and at this strength it is no more than a mixture of 49 pounds of pure alcohol with 51 pounds of water. Brandy, rum, gin, and whiskey, contain nearly similar proportions.

Scientific American.

From the Cotton Planter and Soil of the South.

Untie the Hame String.

DR. CLOUD:

Dear Sir.—Not a year passes but what we hear of some negro being thrown from his mule or horse, going to or from the field, his feet hanging in the traces, and getting killed, or badly injured—perhaps for life. I have thought for five or six years past that I would give, through some agricultural Journal, a remedy for these disasters, which *never fails* to prevent all accidents of this sort, but kept forgetting it; being reminded of it only when I would hear of some unfortunate plowman being thrown and badly mangled. Had I done so sooner, it might have saved the life of some one now in his grave. I now give the remedy without charge, but beg "everybody and the rest of mankind" to adopt it at once. *Never permit a negro to get upon the back of a mule*

or horse, under any circumstances whatever, with the hame string tied—if they do, whip them without fail. Then if they are thrown from their animals, and they get tangled with the chains, negro and gear all come to the ground together, nine times out of ten. Remember it everybody. Yours, &c.,

G. D. HARMON.

From the Ohio Cultivator.

The Sewing Machine.

Among the departments of labor to which the attention of inventive genius has been turned, resulting in the production of labor saving machines, we are glad to know the department belonging more especially to women, has not been passed by. The sphere of labor, which seems to fall naturally to the lot of woman, is composed of an unceasing round of duties, the majority of which, perhaps, considered singly, appear trivial, yet when performed faithfully by the patient housewife, leave her little or no time for rest, intellectual enjoyment, or mental culture, and often prove too much for her physical strength. As a wife, she has no time to cultivate her mind and acquire knowledge fitting her to be a social companion for her husband, or, as a mother, to implant the germs of knowledge in the minds of her children, and lead them forth in the paths of moral and intellectual advancement.

One thing which weighs most heavily upon the hands of the housewife, is her family sewing. Every moment of time which she can spare from her active labors, must be devoted to the needle. Stitching, toiling, often late into the night, robbing her system of its needed rest, she manages to clothe her family in garments which her own busy fingers have fashioned.

How many a noble woman has struggled and toiled, rearing a large family, who, when they no longer required her care, beheld her frail, over-wrought form, trembling on the verge of the grave, and the existence, which might have been prolonged far down the pleasant slope of a peaceful old age, brought to an untimely close.

But a remedy for the evil has been presented to woman, in the Sewing Machine. It takes the work from her weary fingers, which would occupy them for long, weary hours, and completes it in a few brief minutes, performing the labor of weeks in a few days, it gives to woman, leisure for recreation and intellectual pursuits: thus enabling her to elevate herself to a position in which she can be a social companion for her educated husband, a guide, in the paths of knowledge, to her children, and be respected in society, as well for her wisdom and intelligence, as for her womanly graces and attractions.

The time will yet come, when the Sewing Machine will be as essential an article of household furniture as the cooking-stove, and the long, weary task of family sewing will be but little more than a pleasing pastime. ELLIE WATSON.

Westfield, Sept., 1858.

From the Rural New Yorker.

Hints on Farm Improvement.

"How can I improve my farm—how can I increase its symmetry, fertility, and capacity for profitable cultivation?" asks the progressive farmer, and the question receives his earnest and frequent consideration. He studies the condition of his farm, and its facilities for improvement, with an eye to putting it into the highest state of productiveness within his reach. He looks to its adaptation to different products, and to the best means of preparing for large returns from those suited to its capacity; not by the twilight of tradition alone, but in the sunshine of modern agricultural literature, an aid to which he gratefully acknowledges his obligations. *Every farmer* should study thus—should earnestly seek to *make the best* of the means and opportunities he possesses.

One of the first questions—to take practical particulars—to be considered is this: "Do I avail myself of every means within my reach to increase my stock of manure? Do I give care and labor to this object, commensurate with its importance in furthering the ends proposed?" If so, the ground and basis of farm improvement is laid. If not, let the matter receive greater attention, resting assured that a reasonable amount of labor in this department will be well rewarded, and cannot be withheld without great prejudice to progress.

The division of the farm into fields of an extent appropriated to the amount of manure made in any year, should be accomplished. Especially should this be the case, on all farms where a mixed husband-

ry is practiced. The true way to put a farm into good order is, take one or more fields, each year, and *finish up the work.* Fence it well, clear it of stones and stumps, underdrain if needed, manure it heavily, and plant to corn and potatoes. These, carefully cultivated, will leave the land in good condition for a grain crop, and seeding to clover and other grasses, and this course followed from field to field, with good management of every crop, will put a new face on any of "our common run" of farms.

Upon the amount of manure should depend the size of our fields—at any rate, it should be our aim to give each field the quantity, which will enable it to grow a large crop. It is poor policy to attempt the cultivation of more land than we can fully fertilize and thoroughly cultivate. We mention corn, as a first crop, because it is one well suited to the place—one not injured by any amount of manure, fresh or fermented, which can be applied—one which can receive that culture necessary to clear the land of weeds, and one having no deleterious influence on any after crop. From a field so treated, we took fifty bushels of shelled corn per acre; the next year, a good crop of barley; and, the clover seed not taking well from drought, had the season following, with a light dressing of manure—twenty-five bushels of wheat (the midge took ten of it)—and the present year, two tons of hay per acre, with a luxuriant second crop now on the ground.

It may be that a field needs underdraining, the whole or in part, in order to profitable cultivation. Why should not this be done—this small field which we would devote to corn, and which, *with draining*, will become one of the best on the farm? Let us not leave this part of farm improvement unperformed. Its results will be returned for many years in largely increased productiveness. It will be taken from the list of hazardous in reward, and be placed among the certainties in product—no longer demanding a peculiar season and culture in order to the remuneration of the labor bestowed upon it.—Almost every farm has fields of this character—fields sure for good culture to return good crops, whatever the season—and almost every farm has those which fail frequently, however much labor may be bestowed, because the season does not suit them—and the grand difference in soil and character lies in the fact that one is porous and friable from drainage, natural or artificial, while the other is hard and sterile from want of drainage—from the presence or effects of stagnant water in the soil.

The present is a good time to begin the work—to look about for materials for increasing the manure heap—for clearing off stone—for draining—for making beginning and putting the whole farm in its highest state of productiveness.

Hints to Farmers.

Toads are the best protection of cabbage against lice.

Plants, when drooping, are revived by a few grains of camphor.

Pears are generally improved by grafting on the mountain ash.

Sulphur is valuable in preserving grapes, etc., from insects.

Lard never spoils in warm weather if it is cooked enough in frying out.

Of feeding corn, sixty pounds ground go as far as one hundred pounds in the kernel.

Corn meal should never be ground very fine, as it injures the richness of it.

Turnips of small size contain more nutritious matter, in proportion, than large ones.

Rats and other vermin are kept away from grain by the sprinkling of garlic when packing the sheaves.

Money expended in drying land by draining or otherwise, will be returned with ample interest.

To cure scratches on a horse, wash their legs with warm soap suds, and then with beef brine—two applications will cure the worst case.

Timber, when cut in the spring, and, exposed to the weather with the bark on, decays much sooner than if cut in the fall.

Wild onions may be destroyed by cultivating corn, plowing and leaving the corn in the plowed state all the winter.

SNOW-BALL PUDDING.—Pare and core large, mellow apples, and enclose them separately in a cloth spread with boiled rice; boil them one hour; dip them in cold water before turning out. Serve them with cream sauce.

Keeping the Teeth Clean.

Microscopical examinations have been made of the matter deposited on the teeth and gums of more than forty individuals, selected from all classes of society, in every variety of bodily condition; and in nearly every case, animal and vegetable parasites in great numbers, have been discovered. Of the animal parasites there were three or four species, and of the vegetable one or two. In fact the only persons whose mouths were found to be completely free from them, cleaned their teeth four times daily, using soap once. One or two of these individuals also passed a thread between the teeth, to cleanse them more effectually. In all cases the number of the parasites was greater in proportion to the neglect of cleanliness. The effect of the application of various agents was also noticed. Tobacco juice and smoke did not injure their vitality in the least. The same was true of chlorine toothwash, of pulverized bark, of soda, ammonia, and various other popular detergents. The application of soap, however, appeared to destroy them instantly. We may hence infer that this is the best and most proper specific for cleansing the teeth. In all cases where it has been tried, it receives unqualified commendation. It may also be proper to add that none but the purest white soap, free from discoloration, should be used.

[*Ohio Valley Farmer.*

Falling Fruit.

The apples, pears and plums are beginning to drop plentifully from the trees. Every one that thus drops is unsound, and has fallen from disease. We are convinced that the increased destruction year by year caused by the curculio and grub, is mainly owing to the excellent accommodations they are permitted to occupy undisturbed in the fallen fruit which lies upon the ground. The progeny of the insects the next year do ample credit in the way of numbers, to the neglect which allowed their undisturbed increase. The pig-sty is the best place for all fruit that falls diseased from the tree. The incipient curculio that finds its way in the recesses of an apple to the domains of Monsieur Grunter, will never eat apples hereafter.

The Tongues of Poverty.

When Leitch Ritchie was travelling in Ireland, he passed a man who was a painful spectacle of palor, squalor and raggedness. His heart smote him and he turned back:

"If you are in want," said Ritchie, with some degree of peevishness, "why don't you beg?"

"Sure it's begging I am, yer honor."

"You didn't say a word."

"Ov course not, yer honor; but see how the skin is speakin' through the holes of me trowsers! Look at me sunken cheeks and the famine that's staring in my eyes. Man alive! isn't it beggin' I am with a hundred tongues!"

Domestic Receipts.

Sweet Pickle Cucumber and Muskmelon.—Take two lbs. of sugar, one ounce of cloves, one of cinnamon, to one pint of vinegar; boil together and skim, then take ripe cucumbers, pare, take out the pulp, cut them into strips one inch thick, throw them into cold water a few moments, then add them to the pickle, and boil until clear; or you can stick a quill through. For muskmelons, take them just as they ripen, before they get mellow, and prepare them the same as cucumbers. When done, put into stone jars, cover tight, and set in a cool place, and you will have a delicious pickle, ready at all times.

Corn Oysters.—Take a dozen ears of corn, (the white flour corn is the best,) grate it off the cob, add to it one pint of new milk, two teaspoonsful of ground pepper, one of salt, a teacup of flour; stir together, and fry them small in hot butter as griddle cakes. Send them to the table hot and covered. To be eat with butter. Good at any meal, but fine for tea, and very much resembling oysters.

Recipe for Rusk.—To one quart of milk add one pound of sugar and half pound butter, one pint of the milk must be warmed to make a sponge of, with yeast and flour, about as thick as pancake batter, let it rise all night. When risen enough, warm the other pint of milk with the sugar and butter, put it into the sponge; knead it, but not very stiff. Let it rise again; when risen enough, mould it into cakes as large as biscuits, place them in tins and let them rise; rub them over with sugar and milk. Bake them in a quick oven. When baked, rub them again with sugar and milk to give them a gloss.

To Make Sandwiches.—Rub one tablespoonful of mustard flour into half a pound of sweet butter; spread this mixture upon thin slices of bread; from a boiled ham, cut very thin slices, and place a slice of ham between two slices of bread prepared as above; cut the sandwiches in a convenient form, and serve. Some chop the trimmings of the boiled ham very fine, and lay them between the slices of prepared bread. This is a good dish of lunch, or evening entertainments.

Cream Fritters.—Beat six eggs until quite light, then stir in one pint of cream, one teaspoonful of salt, half a grated nutmeg, and sifted flour enough to make a thin batter; stir it until it becomes smooth, then drop it by spoonfuls into hot lard, and fry, and serve.

Molasses Cookies.—One coffee cup of molasses, half a cup of butter, three teaspoonfuls of soda, one and a half cream of tartar, flour enough to roll out.

Molasses Pie.—Take nine tablespoonfuls of molasses, six tablespoonfuls of good vinegar, one and a half tablespoonfuls of flour, a small piece of butter, a few slices of lemon, or greated lemon peel; cover with a rich paste. This is decidedly the *best* substitute for apple pie.

From the Southern Farmer.

Progressive Agriculture.

The N. Y. Observer says the following good things of progressive agriculture:

"Under its influence, spring up tasty and convenient dwellings, adorned with shrubs and flowers, and beautiful within with the smiles of happy wives, tidy children in the lap of thoughtful age—broad hearts, and acts as well as words of welcome. Progressive agriculture builds barns and puts gutters on them, builds stables for cattle and raises roots to feed them. It grafts wild apple trees by the meadow with pippins or greenings,—it sets out new orchards, and takes care of the old ones.

It drains low lands, cuts down bushes, buys a mower, house-tools and wagons, keeps good fences and practices soiling. It makes hens lay, chickens live, and prevents swine from rooting up meadows. Progressive agriculture keeps on hand plenty of dry fuel and brings in the oven-wood for the women. It plows deeply, sows plentifully, harrows evenly and prays for the blessing of Heaven. Finally, it subscribes for good religious, agricultural and family journals, and pays for them in advance, advocates free schools, and always takes something besides the family to the county fair.

From the American Ruralist.

Embellishments of a Country Home.

Heartily can we adopt the following sentiments, so beautifully expressed, by a friend of the Prairie state:

"Let others praise the architectural piles, the marbled columns, the glitter of art and the costly embellishments of the crowded city—where hoarded wealth, that has been abstracted from the hands of honest toil, displays itself in the decorations of fashion—but from the pent-up views of walled streets, let *me* hasten to where the pure breezes of heaven freely play over the green landscape, where the leafy boughs spread their cooling shade over my head, while far away, on the broad old prairie, the glowing beams of light are softened to the eye:

"Where the tints of the earth and the hues of
the sky,
In color, though varied, in beauty may vie."

From the ceaseless din, the tainted air, and the crowded street of the city, let me steal away to some sunny bank, where the light zephyrs bear along the sweet fragrance of opening flowers, where the warble of birds, the murmur of the dancing streamlet and the balmy freshness of nature can soothe and tranquilize every fevered disturbance of the mind. Let him, to whom the varied beauties of the smiling earth impart no delight, go to the mart of trade and fashion; but give me the free air that waves the green meadows and rustles the fields of growing corn—let me enjoy the rich bounties of the orchard and the garden—give me the social tranquility and all the rural endearments that cluster around *a country home.*

We live to enjoy happiness; and the happiness of living necessarily depends very much upon what degree of convenience, comfort and enjoyment the place where we live will afford.

The human mind is dependent upon something external to itself for its entire nourishment, culture and expansion. External nature impresses its images, and every thing with which we are surrounded and associated has its modifying influence. Then let him who would cultivate a love of home, contentment and the finer sensibilities, in his own mind—and more especially in the minds of his children—study to make a place *pleasing and delightful to the senses.*

As fine strains of music greet the ear and tranquilize the mind, so, also, pleasing objects meet the sight and impart a more happy and abiding influence. Then, how important that the scenery and objects that are almost continually before our sight should be such as most delight our senses.

With the individual that has been reared in a pleasant home—in a place surrounded by interesting scenery—in the reminiscence of that childhood, the fondest associations of memory will ever cling around '*The Old Homestead;*' and, with true emotions, *he* may sing:

'How dear to my heart are the scenes of my
childhood.'"

POETRY.

From the Southern Homestead.

Scatter the Germs of the Beautiful.

Scatter the germs of the beautiful!
By the way-side let them fall,
That the rose may spring by the cottage gate,
And the vine on the garden wall;
Cover the rough and the rude of earth
With a veil of leaves and flowers,
And mark with the opening bud and cup
The march of summer hours.

Scatter the germs of the beautiful
In the holy shrine of home;
Let the pure, and the fair, and the graceful there
In their loveliest lustre come;
Leave not a trace of deformity
In the temple of the heart,
But gather about its hearth the gems
Of Nature and of Art.

* * * *

Scatter the germs of the beautiful
In the depths of the human soul,
They shall bud and blossom, and bear the fruit,
While the endless ages roll;
Plant with the flowers of charity
The portals of the tomb,
And the fair and the pure about thy path
In Paradise shall bloom.

Bless God for Rain.

"Bless God for rain!" the good man said,
And wiped away a grateful tear;
That we may have our daily bread,
He drops a shower upon us here.
Our Father! thou who dwell'st in Heaven,
We thank thee for the pearly shower!
The blessed present thou has given
To man, and beast, and bird, and flower.

The dusty earth, with lips apart,
Looked up where rolled an orb of flame
As though a prayer came from its heart
For rain to come; and lo, it came!
The Indian corn with silken plume,
And tiny pitchers with flowers filled,
Send up their praise of sweet perfume,
For precious drops the clouds distilled.

The modest grass is fresh and green;
The brooklet swells its song again;
Methinks an angel's wing is seen
In every cloud that brings us rain,
There is a rainbow in the sky,
Upon the arch where tempests trod;
God wrote it ere the world was dry—
It is the autograph of God.

Up where the heavy thunders rolled,
And clouds of fire were swept along,
The sun rides in a car of gold,
And soaring larks dissolve in song.
The rills that gush from mountains rude,
Flow trickling to the verdant base—
Just like the tears of gratitude
That often stain a good man's face.

Great King of Peace, deign now to bless;
The windows of the sky unbar;
Shower down the rain of Righteousness,
And wash away the stain of War;
And let the radiant bow of Love
In beauty mark the moral sky,
Like that fair sign unrolled above,
But not like it to fade and die.

Children.

Come to me, O ye children!
For I hear you at your play,
And the questions that perplexed me
Have vanished quite away.

Ye open the Eastern windows,
That look towards the sun,
Where thoughts are singing swallows,
And the brooks of morning run.

In your hearts are the birds and the sunshine,
In your thoughts the brooklet's flow,
But in mine is the wind of Autumn
And the first fall of the snow.

Ah! what would the world be to us
If the children were no more?
We should dread the desert behind us
Worse than the dark before.

What the leaves are to the forest,
With the light and air for food,
Ere their sweet and tender juices
Have been hardened into wood.

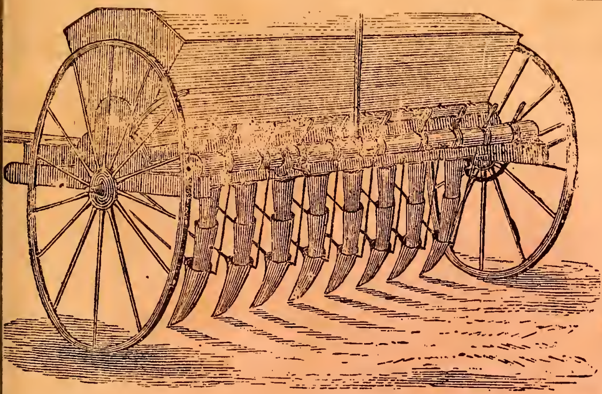
That to the world are children;
Through them it feels the glow
Of a brighter and sunnier climate
Than reaches the trunks below.

Come to me, O ye children!
And whisper in my ear
What the birds and the wind are singing
In your sunny atmosphere.

For what are all our contrivings,
And the wisdom of our books,
When compared with your caresses,
And the gladness of your looks?

Ye are better than all the ballads
That ever were sung or said;
For ye are living poems,
And all the rest are dead.

LONGFELLOW.



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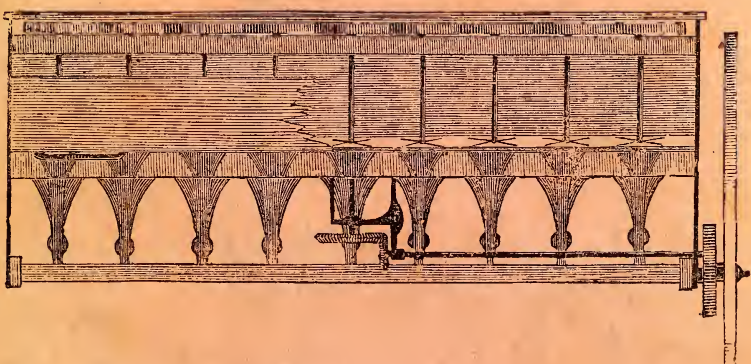

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For French, when studied exclusively of the English branches,	40	For Drawing, from Nature,	4
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